MATERNAL HEALTH AMONG PAKISTANI IMMIGRANTS

Infections, post-partum depression and HLA class II genetics

by

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ABSTRACT

Background

The population in Norway was relatively homogeneous until the 1960s, when there was a large influx of immigrants from low-income countries in Asia and Africa, and especially from Pakistan. A Norwegian report from 2007 showed that immigrants had a higher risk of diseases such as tuberculosis, human immunodeficiency virus, and hepatitis A and B.

Studies of immigrant mothers would provide us with more knowledge about their maternal health, and how to handle their pregnancies so as to reduce the risk of adverse birth outcomes.

Aims

The main aim of this study was to characterize the maternal health of Pakistani immigrants, especially infections of importance for pregnancies and newborns, as well as the prevalence of and risk factors for sexually transmitted infections (STIs) and post-partum depression.

Selected human leucocyte antigen (HLA) class II genes in the Pakistani birth cohort were also studied based on the high proportion of mothers and fathers who are closely related.

Materials and methods

First-generation immigrant Pakistani pregnant women and their husbands who attended ultrasound prenatal screening at 17−18 gestational weeks at two maternity hospitals (Rikshospitalet and Ullevål University Hospital) were randomly recruited to take part in this study. After giving their informed consents to participate, a face-to-face interview was conducted, sometimes at the public health centres in two regions in Oslo (Grunnerløkka and Grønland), where most Pakistani women attend their ante- and post-natal checkups. A further interview was conducted 6-12 weeks after delivery, at which the Edinburgh Post-natal Depression Scale was used to identify risk factors for maternal depression.

Blood or buccal samples were collected from the women, mostly at the first interview, and from their husbands and their newborns. The blood samples from the women were tested for antibodies against different infections, such as cytomegalovirus (CMV), rubella virus, and varicella zoster virus (VZV), *Toxoplasma gondii*, *Chlamydia trachomatis*, herpes simplex virus type-2 (HSV-2) and hepatitis B. Their husbands were tested for STIs.

With regard to genetic testing, DNA from the blood or buccal samples of the women and their husbands were genotyped for selected HLA class II genes. Cord blood or buccal samples taken from their newborns were genotyped in the same way.

Results

A total of 207 Pakistani women and their husbands were recruited.

Communicable infections: All Pakistani women had immunoglobulin G (IgG) antibodies against CMV, while the positivity rates for rubella, VZV and toxoplasma IgGs were 92%, 93% and 17%, respectively. As for hepatitis B, 11% of the women expressed the hepatitis B IgG against core antigen. One of the women was seropositive for the hepatitis B surface antigen, which meant that her blood and cervical secretions were infectious, with a risk of viral transmission to the baby at the time of birth. Six women were only positive for hepatitis B core antibody (i.e. they may have low-level hepatitis B virus infection), but the risk of transmission could not be excluded**.** For most infections, no specific factors were found that indicated high risks, however, for VZV: age younger than 25 years, having less than two children, and having lived less than 5-years in Norway were significantly associated with VZV seronegative status, and thus susceptibility for primary infection.

Sexually transmitted infections: All together 112 couples were tested for antibodies against STIs. The women had significantly lower age, education level and years of residence in Norway compared to their male partners. Among the men, 12% were positive for chlamydial IgG antibodies, in contrast to only 1% of the women. However, these couples were discordant, meaning that the 13 wives of seropositive men were not infected with *C. trachomatis,* and the husband of one the positive women was not infected. For genital herpes, 4% of women and 2% of men were seropositive for HSV-2. Only one couple was concordantly positive for HSV-2, the remaining four couples were discordant. Hepatitis B was the most common infection: 12% of the women and 21% of men either were currently, or had been infected with hepatitis B. All of these 15 hepatitis B affected couples were discordant.

Post-partum depression: The prevalence of post-partum depression among Pakistani women was 7.6%. High scores on the life-event scale, a history of prior depression, single marital status, poor relationship with their partner and age of at least 30 years were found to be significant risk factors for suffering from post-partum depression.

HLA analysis: All 374 available DNA samples (207 women and 167 men) were genotyped for the following HLA class II genes/loci: DRB1, DQA1 and DQB1. We excluded 195 parents (98 mothers and 97 fathers) from the data analysis because they were closely related, with the aim of studying unrelated Pakistani couples. Of the 179 unrelated parents, we identified 25 DRB1, 9 DQA1 and 14 DQB1 alleles in our analysis. The most frequent alleles were DRB*03:01:01 (15.9%), DRB1*07:01:01 (15.9%), DQA1*01:03 (22.1%) and DQB1*02:01:01 (26.0%). There were 41% haplotypes identified, including DRB1:13:02:02-DQA1*01:02-DQB1*06:03:01, a finding that has not been reported previously.

Conclusions

Some infections were highly prevalent (CMV, *Toxoplasma gondii* infection and hepatitis B) among the Pakistani immigrants, with others being less so (rubella and VZV). We believe that the rubella vaccination programme in Norway should be intensified for Pakistani immigrants, and recommend the VZV vaccine be offered to seronegative women. To avoid toxoplasma infection, toxoplasma-seronegative immigrant mothers should be advised not to visit their home country during their pregnancy. We also recommend giving the hepatitis B vaccine to newborns, regardless of the maternal hepatitis B IgG status.

STIs did not seem to be prevalent among the tested Pakistani immigrant couples. However, it was striking that most couples were discordant. Pakistani immigrants should therefore be offered the hepatitis B vaccine.

The prevalence of post-partum depression among the Pakistani immigrants was slightly lower than that reported among ethnic Norwegians (8.9%), and significantly lower than that reported for immigrants in other countries. The risk factors were similar to those of international reports, but there were some cultural differences in therein (being single, being primiparous, and not having breastfed) between Pakistani immigrants and ethnic Norwegians.

The allele frequencies did not differ significantly between the 179 unrelated Pakistani parents and all of the parents genotyped, and confirming that consanguineous marriage is common in Pakistan.

LIST OF PAPERS

I. Bjerke SEY, Vangen S, Holter E, Stray-Pedersen B. Infectious immune status in an obstetric population of Pakistani immigrants in Norway. *Scand J Public Health 2011;39:464–470.*

II. Bjerke SEY, Holter E, Vangen S, Stray-Pedersen B. Sexually transmitted infections among Pakistani pregnant women and their husbands in Norway**.** *Int J Womens Health 2010;2:303–309.*

III. Bjerke SEY, Vangen S, Nordhagen R, Ytterdahl T, Magnus P, Stray- Pedersen B. Postpartum depression among Pakistani women in Norway: prevalence and risk factors. *J.Matern Fetal Neonatal Med 2008;21:889–894.*

IV. Rønningen KS, Yap SE, Brandal K, Stormyr A, Lie BA, Rasmussen T, Stray-Pedersen B, Akselsen HE. HLA-DRB1,-DQA1 and-DQB1 alleles and haplotypes in first-generation Pakistani immigrants in Norway. *Scand J Immunol, in press, 2012.*

PREFACE

When I arrived in the late 1960 as an immigrant to Norway, it had a homogeneous population, but nowadays the population is multi-cultural. I have developed an interest in what is happening in my new home country and want to become better acquainted with my fellow citizens. I have long been interested in paediatrics, but since I was initially living in a rural district it was not possible to specialize in this field. However, today I am very happy to be a general practitioner, and especially so, when I was given the opportunity to conduct research into the maternal health of immigrants to Norway. The Norwegian Mother and Child Cohort Study (MoBa) started without including any of the immigrant populations in Norway. We therefore chose to study Pakistani mothers, who until 2008 were the largest immigrant group in this country.

It is always a miracle when a human-being comes into the world.

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ABBREVIATIONS AND DEFINITIONS

Allele: A certain sequence within a locus

CMV: cytomegalovirus

EPDS: Edinburgh Post-natal Depression Scale

EU: European Union

Anti-HBc: Hepatitis B core antibody

Anti-HBs: Antibody to hepatitis B surface antigen

HBeAg: Hepatitis B e antigen

HBsAg: Hepatitis B surface antigen

HBV: Hepatitis B virus

HIV: Human immunodeficiency virus

HLA: Human leucocyte antigen

HPV: Human papillomavirus

HSV: Herpes simplex virus

HSV-1: Herpes simplex virus type 1

HSV-2: Herpes simplex virus type 2

IgG: Immunoglobulin G

IgM: Immunoglobulin M

Locus: One polymorphic gene

Loci: Polymorphic genes

MHC: Major histocompatibility complex

MMR: Measles-mumps-rubella vaccine

MTCT: Mother-to-child-transmission

PCR: Polymerase chain reaction

PHQ-9: Nine-item Patient Health Questionnaire

STIs: Sexually transmitted infections

TORCH: Toxoplasmosis, Rubella, CMV, Herpes simplex and “Others”

TFR: Total fertility rate

TOP: Termination of pregnancy

VZV: Varicella zoster virus

Labour immigrants/migrants: Immigrants/migrants who work as labourers in their new home country.

Low birth-weight: Weight of newborn baby is 2500 g or less.

Preterm birth: Babies born before 37 completed weeks of pregnancy.

Perinatal mortality: Stillbirths of a foetus of 22 gestational weeks or more or with a birthweight ≥500 g, or death of a newborn within the first week of life.

Neonatal mortality: Death of a live-born infant during the neonatal period from birth until the first 28 days after delivery.

Post-natal mortality: Infant death occurring between 28 days and the first year of life.

Maternal mortality: Death of the mother resulting from complications of pregnancy, labour or puerperium, or from interventions, omissions, incorrect treatment or a chain of events resulting from any of these factors until 42 days after birth.

Total fertility rate: The mean number of children, who under actual fertility conditions, will be born to a woman during her fertile period.

Consanguinity: Two individuals are considered consanguineous if they have at least one ancestor in common. The term usually refers to mating between fourth-degree relatives such as second cousins or closer.

Migration: People moving from one country to another country.

First-generation immigrant: A person born in one country who moves to another country to live.

Second-generation immigrant: A person born in one country of two foreign parents.

Norwegian-born of immigrant parents: A person born in Norway of two foreign parents.

Immigrant population: Defined according to the Statistics of Norway as first-generation immigrants and their children.

Low-income countries: Countries that had gross national income per capita per year of US$ 1005 or less in 2008.

1. INTRODUCTION

1.1 Immigrants and health

Migration has become an integral part of global social and economic development. Better communication and faster transport systems increase the rates of both voluntary and forced migration. The USA, Canada and Australia were built on migration, and most European countries were saved by being able to send millions of people to other places when confronted with massive agricultural, political or economic crises (Carballo and Nerukar 2001). Patterns of immigration are affected by geographical and historical factors as well as by economics, conflict, environmental and political crises. Poverty and the desire for a better life are significant drivers (www.ecdc.europa.eu). They carry with them the health profiles that result from poverty (Carballo and Nerukar 2001). Forced migration, in the form of human trafficking, is an issue of increasing concern (Szilard and Barath 2007).

While immigrants can be healthy people with initiatives and a sound financial status, even under the best of conditions, migration involves a series of events that can be highly traumatizing and that can place immigrants at risk. From a public health point of view, migration has serious ramifications for the people who move, the family they leave behind, and the communities that host them as newcomers. Migration means breaking with family, friends and established social networks, departing from traditional routines and value systems, and inducing feelings of isolation: these are all often detrimental to both the mental health and social integration of the immigrant (Carballo and Nerukar 2001).

Migration is a process of social change whereby an individual moves from one cultural setting to another for the purpose of settling down in the new environment either permanently or for a prolonged period (Syed and Vangen 2003). It is a complex and dynamic process that can impact the immigrant's health, both positively and negatively depending on several conditions associated with individual, social, environmental and health-related factors. Immigrant health has therefore been regarded as a public health challenge in several countries (Abebe 2010). Language barriers and the lack of culturally sensitive information and translation services hinder effective communication regarding diagnosis, treatment and adherence to treatments (www.ecdc.europa.eu).

Migration is often associated with major changes in environment and behaviour, most notably changes in dietary habits, nutrient intake and physical activity, which are influenced

by a process of urbanization or westernization. This has subsequently led to an increased risk of chronic diet- and lifestyle-related diseases in ethnic-minority groups (Gilbert and Khokhar 2008). Several studies over the past decades have indicated that the risks of obesity, diabetes, cardiovascular diseases and vitamin D deficiency are higher among immigrant communities than within both their country of origin and the mainstream population (Abebe 2010). Social integration is not easy for many immigrants, and is impossible for some.

Furthermore, it is not only the immigrants themselves who are affected, but also their children, who may be discriminated against in many situations, ultimately leading to a high risk of drug abuse to demonstrate their rejection of, and exclusion from, so-called mainstream society. Alcohol abuse among Indian and Pakistani males is increasing in the UK, and drug abuse is common among immigrants in the UK and the Netherlands (De Jong 1994, Lipsedge et al.1993).

The incidence of work-related risks and other types of accident tends to be higher among immigrants. Immigrants tend to take jobs that are temporary, require less skill, and are largely unattractive to local labour forces. Many jobs that are available, such as those involving heavy manufacturing in factories and industries, and all sorts of cleaning jobs, often involve poor environmental conditions and safety (Bollini and Siem 1995).

The range of health issues that can be associated with migration is inevitably broad, and their health has social and economic consequences for the host countries as well as for the immigrants themselves and their families.

1.1.1 Reproductive health among immigrants

Reproductive health in general, and especially among women, seems to be affected by changes in their social and economic environment. Nutritional and lifestyle transition, access to education and health care, and changes in sexual behaviour play important roles here. A study performed in Italy found that adverse socioeconomic conditions such as a maternal age younger than 18 years, low family income, inadequate obstetric care and difficulty accessing the public health services are common among immigrants from Northern Africa, Eastern Europe and Sub-Saharian Africa (Bona et al. 2001). There is evidence that the risk of pregnancy-related illness and adverse pregnancy outcomes is higher among immigrants to Europe from low-income countries in Asia and Africa than among the ethnic populations (Carballo and Nerukar 2001). They have more low-birth-weight babies, tend to deliver preterm more often and have a higher incidence of neonatal mortality (Bona et al. 2001). In

Italy, the spontaneous abortion ratio has been reported to be higher among immigrants (213.8/1000 live births) than among the ethnic residents (154.6/1000 live births) (Medda et al. 2002). However, immigrant women in Canada reported less physical abuse and stress, and they smoked and consumed less alcohol during pregnancy than did Canadian-born women. The duration of residence in Canada influenced the immigrant women's maternity experiences (Kingston et al. 2011).

Fertility

The changing of society from traditional agricultural to increasingly urban industrial is known to be followed by a demographic transition from high to low fertility. It has been suggested that women's education and work-force participation are key predictors of the fertility transition (Caldwell 1999).

The total fertility rate (TFR) in the country of origin, years of residence in the new country, and the husband's country of origin and religion are reported to significantly influence the fertility rate among immigrants (Lappegaard 2000). The fertility rates in Norway differ between immigrants from Asia, Africa and Latin-America and the ethnic Norwegian population (Statistics Norway 2010). The TFR in Norway is 1.95, and is among the highest in Europe: only Iceland and Ireland have a higher fertility rate than Norway (Statistics Norway 2011). The TFR is 2.2 among Norwegian immigrants from Asia, Africa and Latin-America, and was reportedly highest (at 6) among immigrants from Somalia in 1996. Fertility among immigrants decreases with increasing years of residence in Norway (Statistics Norway 2010). In 2000 TFR among Somalis had reduced to 4.5 and it continues to fall. Immigrants from India, Iran and Vietnam have TFRs closer to that of the ethnic Norwegian population (Statistics Norway 2010).

Family planning and pregnancy termination

Immigrant women make poor use of contraceptive services with unwanted pregnancies being the consequence. Requests for abortion and termination of pregnancy (TOP) tend to be higher among immigrants from Africa and South America than among Spanish women (Carballo and Nerukar 2001). A study from Italy found that the risk of induced abortion was higher among foreigners (34.8/1000 women) than among all residents (10.5/1000 women) (Medda et al. 2002). The combination of low education and poor social status seemed to have an important influence on TOP rates. Labour migrants, and the refugee women's transitory and vulnerable position further adds to the risk of TOP (Vangen et al. 2008).

Unfortunately, women are still regarded as second-class citizens in some migrant communities (Carballo and Nerukar 2001).

Birth outcomes

The risk of obstetric-related complications and perinatal mortality in Norway was found to be higher among immigrant women from Asian and African countries than among ethnic Norwegians and Western immigrants (Abebe 2010). The risk factors were consanguineous marriage, low or inconsistent use of contraception, low education and poor socioeconomic status. Lack of experience and knowledge among health workers, and communication problems between health-care providers and immigrant patients were also mentioned as possible challenges (Abebe 2010).

Another study found that mean birth-weights were low for Asian (Vietnamese and Pakistan) mothers and high for Norwegian and North African mothers (Vangen et al. 2002).

However, it should be noted that the immigrant group with the lowest mean birth-weight also had the lowest perinatal mortality. In Spain, preterm births, low birth-weight and delivery complications were especially common among immigrants from Africa and Central and South America (Carballo and Divino 2002). In the United Kingdom, babies from Asian mothers tend to have lower birth-weights than other babies, and peri- and post-natal mortality rates are higher among immigrants born in Pakistan and the Caribbean than in the general population (Bundey et al. 1991). In Germany, perinatal and neonatal mortality rates were reported to be higher in foreign-born groups, and especially Turkish immigrants, and the incidence of congenital abnormalities and maternal mortality were also higher among immigrants (Huismann et al. 1997).

Studies have shown that socioeconomic factors might play a strong role in pregnancy outcomes of foreign-born women (Forna et al. 2003).

Although our understanding of the relationship between migration and health is continually improving, there is still much to learn regarding the migration and health of women of reproductive age.

1.1.2 Mental health among immigrants

Psychological health may be affected by the process of leaving family and coping with job insecurity, legal problems, and unfamiliar language and culture. Psychological distress is a measure of mental health, as represented by symptoms of anxiety, depression and somatization. The ethnic Pakistanis reported a higher prevalence of psychological distress:

22.0% compared to 9.9% in ethnic Norwegians (Syed et al. 2006). Furthermore, the Oslo Health Study found that the prevalence of psychological distress was significantly higher among immigrants from low- and middle-income countries than among immigrants from high-income countries. While both pre- and post-migration factors were associated with distress, the latter were the most important indicators for the difference between the two groups of immigrants. Lack of a salaried job, recent negative life events, past traumatic experiences, living without a partner, low social support and poor knowledge of the Norwegian language, were associated with mental distress (Hauff 2006).

Cultural conflict plays an important role in predisposing some immigrants to some diseases such as depression, chronic anxiety and neuroses. In general, the trauma and exclusion increase their susceptibility to all diseases (Carballo and Nerukar 2001).

In Germany, 13−25 % of immigrants were estimated to be at risk of developing depressive disorders, this is also associated with high rates of suicide in many European Union (EU) countries, and is possibly linked to unemployment (Carballo and Nerukar 2001). A study from Sweden found that the country of birth was a significant risk factor for poor self-reported health and psychosomatic complaints, with the risk being higher among women from Southern Europe, female refugees and Finnish women, than in Swedish women (Iglesias et al. 2002).

1.2 Historical background of immigration to Norway

Norway was a relatively homogeneous country until the 1960, when there was a considerable migratory influx of labour immigrants, particularly from Pakistan, Morocco and Turkey. Restrictions on immigration for working purposes imposed in 1975 limited immigration to refugees , asylum seekers, special labourers, family reunions and marriages, but in 2005 it was opened again for labour immigrants from EU countries (Norwegian Institute of Public Health 2010).

Norway has become a multicultural society with a population of 4.9 million, of which 600,000 (12.2%) are immigrants from more than 200 countries. Of these, 500,000 (83.3 %) are first-generation immigrants, and 100,000 (16.7%) are Norwegian-born of immigrant parents. Immigrants from Europe constitute 5.8% of the total population: 4.3% from Asia, 1.5% from Africa, 0.4% from South- and Middle America, and 0.2% from North-America. Oslo

has the highest percentage of immigrants, who represent 28% of Oslo citizens (Statistics Norway 2011).

Table 1 shows largest immigrant groups in Norway.

Table 1.

Largest immigrant groups in Norway as at 1. January 2011 (Statistics Norway 2011)

Country of origin	Immigrant population
Poland	**60610**
Sweden	**34108**
Pakistan	**31884**
Iraq	**27827**
Somalia	**27523**
Germany	**24394**
Vietnam	**20452**
Denmark	**19522**
Iran	**16957**
Lithuania	**16309**
Bosnia-Herzegovina	**16125**
Russia	**15879**
Philippines	**14797**
United Kingdom	**13395**
Thailand	**13293**

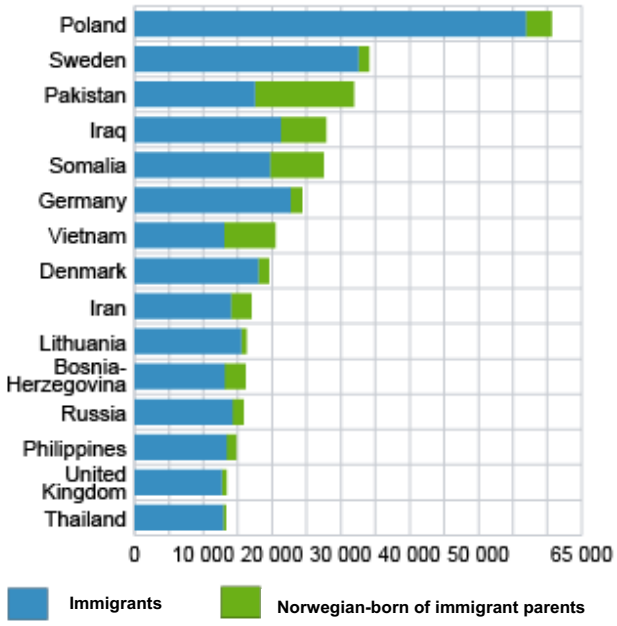

Figure 1: Largest immigrant groups in Norway as at 1. January 2011
(Statistics Norway 2011)

The immigrant population in Norway constitutes of a non-homogeneous group, with differences in age, gender, employment, education, language, home-country background, ethnic belonging, religion and outlook in life. However, these individual variations are similar to those in the general Norwegian population (Norway Wiki 2010).

1.3 Pakistani immigrants in Norway

Pakistan is a developing country whose population is largely poorly educated and underprivileged (Qidwai et al 2003). The Norwegian immigration to North America 100 years ago and Pakistani immigration to Norway 40 years ago have parallel traits (Stoltenberg 1998).

The first Norwegian-Pakistani men came to Norway in 1967 as labour immigrants. Most of them came from Punjab, a poor rural district in Pakistan, and the majority had only a low level of education. Pakistani people constituted the largest immigrant group (9%) until 2008 and 30% of them have now lived in Norway more than 25 years. The majority lives in Oslo and its suburbs. First-generation Pakistani immigrants are not well integrated into Norwegian society, and are over-represented in the transport and hotel/restaurant industry. They constitute a larger proportion (5.3% versus 3.7% of the total Norwegian population) of founders and self-employers. The proportion of Pakistani men in employment is greater than is average for the immigrant population, but the opposite is true for Pakistani women. Second-generation Pakistani immigrants are well integrated into Norwegian society, have a higher education level compared with their first-generation counterparts, and are expected to be more employed in the future (Statistics Norway 2009, 2010).

Most first-generation Pakistani women came to Norway for marriage. As with their husbands they grew up in rural districts where the education level was lower than in urban areas. According to Statistics Norway, first-generation Pakistani women have a lower education level and income, and more children compared to second-generation Pakistani women, who are more similar to ethnic Norwegians in this regard (Statistics Norway 2010, 2011).

Consanguineous marriages are common in Pakistan despite their declining popularity in the developed world. The main reasons in favour of consanguineous marriages are quoted as: “it is healthy to marry within the family” and “it is traditional”. Constraints of religion, status, caste, family differences and the fear of incompatibility are among the reasons quoted as difficulties in finding a partner outside the family. The rates of neurological diseases, diabetes mellitus, hypertension, congenital malformation, stillbirths and infant deaths are reported to be higher in consanguineous marriages (Qidwai et al. 2003, Stoltenberg 1998). In her thesis study, Stoltenberg (1998) found that the overall risk of birth defects, stillbirth and infant death was higher for children with Pakistani parents than for children with Norwegian parents. Reasons for the continued popularity of consanguineous marriages in Pakistan are the security of knowing the partner in the family, culture and religion, and having more information about the partner before marriage (Qidwai et al. 2003). It has been argued that the main reasons for a preference for consanguineous marriages in Pakistan are sociocultural rather than for any perceived economic benefits, either in the form of consolidation of family property or smaller and less expensive dowries (Hussain 1999). The

prevalence of first-cousin marriages decreases as the level of education improves (Qidwai et al. 2003). A reduction in consanguineous marriages has been noted in Norway in recent years (Grijbovski et al. 2009).

In 1990, the TFR among Pakistani immigrants was 4. Today, Pakistani immigrant women have an average of 3.4 children, while the averages for Asian women and ethnic Norwegian are 2.2 and 1.9, respectively. The high fertility rate among Pakistani women might have a negative impact on their employment, and it could be due to the traditional sex partition, whereby Pakistani women born and growing up in Pakistan take care of the children and home, while men feed the family (Statistics Norway 2009, 2010). This tradition may change, and in fact second-generation Pakistani immigrants have almost the same TFR as the Norwegian population (Figure 2) (Statistics Norway 2010).

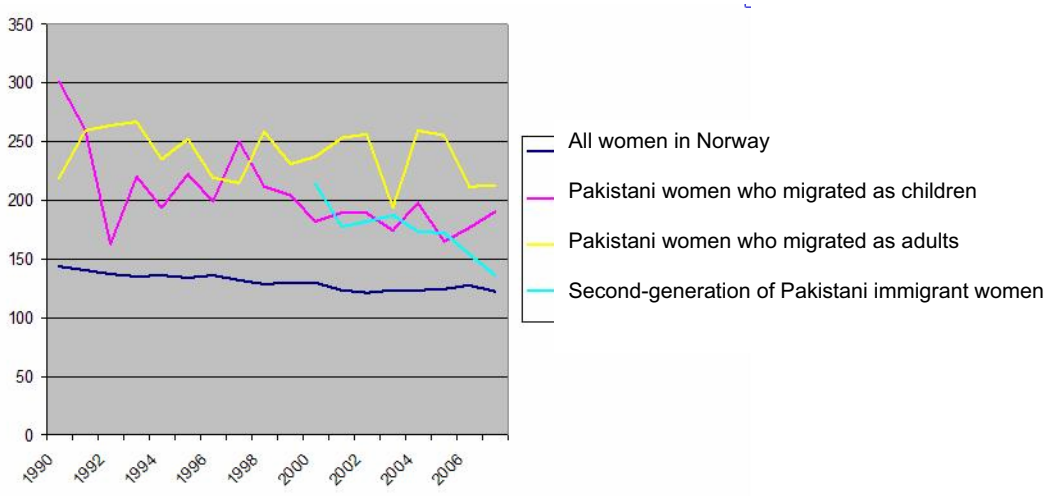

Figure 2. Number of women who give birth per 1000 women in the age group 25–29 years in the total Norwegian population and among first- and second-generation Pakistani women

A study from Oslo showed that the rates of termination of pregnancy (TOP), was higher among women of Pakistani origin (18.4 per 1000 women per year) than among ethnic Norwegians (16.7 per 1000 women per year) (Vangen et al. 2008). Among labour immigrants high abortion rates were found among older women indicating an unmet need for contraception. Refugees had the highest abortion rates among all age groups (Vangen et al. 2008). That report suggests that a low education level is associated with a high frequency of

induced abortion among Norwegians, while Pakistani women with a higher education are more likely to experience induced abortion (Eskild et al. 2007).

1.4 Infections of importance for reproductive health

Infections vary widely worldwide. A thorough understanding of the endemic infections in the regions of an immigrant's origin and travels, and sensitivity to cross-cultural issues are helpful in providing immigrants with appropriate medical care (Avery 1999). The prevalence of disease among immigrant groups varies with national and ethno-cultural origin, forced versus voluntary migration, and time since arrival in the host country (Grossman et al. 1999). The infection status of first-generation immigrants usually reflects the situation in their home country. A report from 2007 in Norway showed that the incidence of severe infectious diseases was higher among immigrants from Africa and Asia than among ethnic Norwegians, especially for tuberculosis, human immunodeficiency virus (HIV), and hepatitis A and B (Næss et al. 2007).

Some infections have the potential of infecting the foetus or newborns. All infections listed in Table 2 can cause foetal or perinatal infection, and are sometimes associated with adverse outcomes such as foetal loss, stillbirth, foetal damage, prematurity, or acute neonatal infection.

Table 2. Most important infections in pregnancy that can affect the foetus or newborn

Virus	Parasites / bacterias
Cytomegalovirus	*Toxoplasma gondi*
Rubella	*Treponema pallidum*
Varicella-zoster	Group B streptococcus
Hepatitis B and C	*Listeria monocytogenes*
Parvovirus B19	
Herpes simplex virus	
Human papillomavirus	
Human immunodeficiency virus	

Another infectious agent, streptococcus A, may cause a puerperal fever that is a persistent threat to the women themselves; generations of women have lost their lives during and after childbirth as a result of this streptococcal infection.

1.4.1 Perinatal infections

Mother-to-child transmission (MTCT) of infections may cause significant morbidity and mortality among children. The understanding of the epidemiology, pathogenesis, diagnosis and prevention of infections transmitted from mothers to children has improved tremendously in recent years (Read et al. 2008). The infection panorama is constantly changing. The infections that were the most common 20−30 years ago have been replaced with other infections. Increased knowledge about immunology, better diagnostic possibilities, more broad-spectrum antibiotics and different screening and vaccination strategies have contributed to this change in the infection spectrum. Syphilis and rubella were formerly frequent causes of foetal damages, but are now seldom seen in Norway.

Infections with cytomegalovirus (CMV), hepatitis, streptococcus group B and *Chlamydia trachomatis* may be of greater importance today (Stray-Pedersen 1997). A study from Italy found that the incidence of neonatal mortality was higher among infants born to immigrant mothers than among newborns with Italian parents (Bona et al. 2001). Maternal infections such as hepatitis B virus (HBV), HIV, syphilis and tuberculosis contributed to this finding.

In 1974 an American paediatrician, Nahmias, introduced the acronym TORCH that encompasses various congenital infections: toxoplasmosis, rubella, CMV, herpes simplex virus (HSV) and “others”. This encouraged paediatricians to remember that various infections could have been transferred from the mother to the foetus when newborns had unclear illness symptoms. It is common for pregnant women with these infections to have no symptoms or signs, but the infections can be transferred through the blood across the placenta or through direct contact during vaginal delivery. The newborns can develop sepsis, pneumonia or meningitis some days after birth, or they may be asymptomatic in the newborn period, but manifest complications later, such as eye, ear and brain damage (Nahmias 1974). Screening of the pregnant population may help to prevent congenital and perinatal infections due to the TORCH agents (Tamer et al. 2009). The possible outcomes of infections in pregnancy are listed in Table 3.

Table 3. Possible outcomes of infections in pregnancy

Abortion and stillbirth	Foetal damage -obvious at birth
Congenital abnormalities	Late development or manifestation
Neonatal acute illness or death	Asymptomatic infection

Infections of the infant may be acquired from the mother *in utero* (congenital infection), during delivery (intrapartum infection) or in the neonatal period (post-partum infection), see Table 4.

Table 4. Routes of mother to child transmission

Intrauterine	- Transplacental
	- Ascending infection
Intrapartum	- Contact during delivery with infected genitalia secretions/blood
Post-partum	- Breastfeeding
	- Close contact with infective persons

1.4.2. Communicable infections

Cytomegalovirus

Cytomegalovirus (CMV) which was discovered in 1956, belongs to the herpesvirus family and is widespread. About 60 % of the people are infected with CMV by the time they reach 40 years of age. CMV lies latent in haematopoietic stem cells, monocytes, macrophages and dendritic cells, and can be reactivated, both in healthy persons, and more often under special circumstances such as pregnancy, immune-system failure or malignant diseases. CMV infection is often asymptomatic, but can present with fever, throat pain, and lymphadenopathy (Norwegian Institute of Public Health 2009).

CMV is the most common cause of viral intrauterine infection and non-hereditary deafness. It is transmitted by contact with saliva, breast milk, urine or genital secretions (Gilbert 2002).

In utero transmission can occur during primary maternal infection and during reactivation or reinfection. Jaundice, thrombocytopenia, hepatomegaly, petechiae, purpura and splenomegaly are reported signs in infected infants. Up to 40% of all infants born to mothers with primary infection during pregnancy have been reported with sensorineural hearing loss and intellectual impairment (Gilbert 2002). Affected newborns may have only one or several symptoms or signs. However, the vast majority of congenitally infected infants are asymptomatic at birth (Read et al. 2008). Foetal damage is most likely if the mother acquires the infection in early gestation. Reactivation of maternal infection during pregnancy can also cause foetal or perinatal infection (Gilbert 2002). Prenatal diagnosis should be performed in suspected cases. Ultrasound can identify abnormalities. Amniocentesis to identify virus excreted from the foetal urine is first recommended after 22 gestational weeks due to the development of the kidneys. In most cases, at least 6–9 weeks must elapse from the time of maternal infection before the virus can be detected in amniotic fluid by culture or using the polymerase chain reaction (PCR) technique (Lazzarotto et al. 2008). PCR tests for application to dried blood spots are being developed (Barbi et al. 2008). Virus detection indicates an infected foetus, but does not indicate whether the foetus is affected by the virus (Gilbert 2002).

CMV excretion is common in infected persons, especially in children. About one-third of children in kindergarten may excrete CMV in their saliva and urine (Norwegian Institute of Public Health 2009). Some countries recommend urine screening of newborns (Foulon et al. 2008). In Pakistan 16.5% of pregnant women are currently seropositive for CMV (Shams et al. 2011), while in Norway the prevalence is 72% (Eskild et al. 2005). There is currently no vaccine against CMV, and antiviral drugs given to the mother usually have no effect. New trials with hyperimmunoglobuline E are yielding promising results (Nigro et al. 2005). Good hand hygiene (Cannon and Davis 2005) and practicing safe sex (Staras et al. 2008) are recommended.

Rubella

The rubella virus usually produces a mild viral disease, and was discovered in 1962. The virus is spread by droplets, including in asymptomatic cases (Norwegian Institute of Public Health 2009). Symptoms are mild, and up to 80% of infections may be subclinical or unapparent. In children, a rash is usually the first and only manifestation. Other symptoms are fever, malaise, upper-respiratory symptoms and lymphadenopathy with nodes behind the ear and

on the neck that may last several weeks. The rash of rubella is maculopapular starting in the face and progressing from head to foot. Rubella is a serious infection in pregnant women, arthralgia or arthritis may occur in up to 70% of pregnant women who contract the virus. The infection may lead to spontaneous abortion, foetal death, preterm delivery or a congenitally infected child with severe disabilities (Stray-Pedersen 2011).

Congenital rubella syndrome may occur in up to 50% of infants born to women who acquired rubella during their first trimester. The syndrome consists of the classic triad of cataracts, deafness and congenital heart disease. After 16 gestational weeks the harm to the foetus is negligible (Gilbert 2002). Reinfection is fairly common (>50% in the vaccine-immune patient and 5% in the naturally immune patient), but this infection is almost always subclinical and not teratogenic (Best et al. 1989).

Serologic testing is the cornerstone of the diagnosis of rubella infection in the mother. Ultrasound may detect brain and heart defects, but not eye or ear damage. Amniocentesis should preferably be performed 6−8 weeks after maternal infection, while cordiocentesis, foetal blood sampling for specific Immunoglobulin M (IgM), will be reliable only if the foetus is at least 22 weeks old. Positivity for IgM in foetal blood confirms foetal infection, but provides no information about the type or level of damage: in fact, an infected child could be completely normal. The virus, which can be detected by viral culture or by antigen identification by PCR with samples from urine, conjunctival fluid or the oropharynnx could be shed for many years (Stray-Pedersen 2011).

In Pakistan, 18% of pregnant women in Karachi (Ahmed et al. 2006) and 39% in Islamabad (Adil et al.2005) were found to be rubella seronegatives. Today, 5−10% of fertile women in Norway are thought to be rubella seronegatives (Norwegian Institute of Public Health 2009). No antiviral treatment is available for rubella. Rubella immunoglobulin G (IgG) is recommended, but not effective. Vaccination in childhood against rubella has been established in the Western world for over 40 years, while globally there remain many countries that have not introduced the vaccine, or have only recently introduced a rubella vaccine program (Stray-Pedersen 2011).

Varicella (chickenpox)

Varicella-zoster virus (VZV) causes varicella (chickenpox) and was identified in 1952. After primary infection, the virus remains latent in the dorsal root-ganglia. Reactivation of latent

virus leads to herpes zoster. Varicella is usually a mild disease in children, but may be severe in adults, and especially in pregnant women (Norwegian Institute of Public Health 2009). Maternal mortality can be as high as 30% with varicella pneumonia and encephalitis (Gardella and Brown 2007).

Foetal infection occurs in 10−15% of cases of maternal varicella infection, but is usually transient and asymptomatic. However, 2−3 % of the infants of mothers who had chickenpox from 12 to 20 weeks of gestation develop congenital varicella syndrome, with potentially severe defects, including skin scarring, limb hypoplasia, and visceral, neurological or eye lesions (Gilbert 2002). Another risk group is newborn infants whose uninfected mothers are exposed to VZV shortly before or after birth: these children are at high risk of developing severe or fatal chicken pox (Gardella and Brown 2007).

VZV-infection is a childhood disease in the Western world. Most cases (90−95%) are infected as children. The seroprevalence of VZV increases with age in Pakistan, 28.4%, 41.5%, 42.5%, 46.7% and 53.6% of those aged 0−5, 6−10, 11−15, 16−20 and 21−30 years, respectively, are seropositive for VZV (Akram et al. 2000). In Norway, 90−95% of adults have been infected with VZV (Norwegian Institute of Public Health 2009). The epidemiology of varicella varies markedly between tropical and temperate regions (Stray-Pedersen, available at: http://www.legeforeningen.no/id/131715.0). Obstetric populations born in tropical or subtropical regions are likely to be seronegative for VZV, and will therefore benefit greatly from being screened for varicella immunity and offered vaccination outside of pregnancy.

Toxoplasmosis

Toxoplasmosis is a worldwide disease caused by *Toxoplasma gondii,* which is a protozoan parasite. *T.gondii* was identified in 1908 and is widespread in mild and wet areas (Norwegian Institute of Public Health 2009). Infection is acquired mainly via ingestion of food or water that is contaminated with oocytes shed by cats or by eating undercooked or raw meat containing tissue cysts. Primary infection with the *T. gondii* parasite in pregnancy may cause abortion, or be transmitted to the foetus, causing congenital toxoplasmosis which can cause damage to the central nervous system,(e.g. cerebral calcification, hydrocephalus or microcephaly) and chorioretinitis. The outcome for the foetus depends on the gestational age at infection. The infection risk is about 15% if the mother acquires toxoplasma in the first trimester, and increases to about 30% and 60% in the second and third trimesters,

respectively (Montoya and Liesenfeld 2004). Children and adults up to 20 years old could have late reactivation that results in eye lesions (Norwegian Institute of Public Health2009).

Toxoplasma infection occurs worldwide, with up to one-third of the world's population being infected, including those living in Pakistan (Ally and Idris 2004, Montoya and Liesenfeld 2004). Congenital toxoplasma infection is rare: it was recently reported to be approximately 0.3 per 1000 live births in Denmark (To 2009). In Pakistan, the seroprevalence of toxoplasma antibodies was high (60%) in the age group 21 to 40 years, and was especially common in females (Ally and Idris 2004). Seropositivity for toxoplasmosis among pregnant women was 63% in Punjab (Bari and Khan 1990), and 32.4% in Khyber Pukhtoonkha (Shams et al. 2011).

Until 1995 it was obligatory in Norway to report cases to The Norwegian Surveillance System for Communicable Diseases (MSIS)**,** 30−40 toxoplasma infections were registered annually, of which 5−10 were children younger than 1 year (Norsegian Institute of Public Health 2009).

The seropositivity rates among women of reproductive age in Norway and Sweden were reported to be 10.0% (Jenum et al.1998), and 14−25.7% (Petersson et al. 2000), respectively.

Studies from Norway and Sweden indicate that the prevalence of toxoplasma antibodies is higher among immigrants than ethnic Scandinavians (Jenum et al. 1998, Petersson et al. 2000).

There is no vaccine against toxoplasmosis, and hence primary prevention with information of how to avoid toxolasma infection is encouraged. Screening programmes to prevent congenital toxoplasmosis have been ongoing for 40 years in Europe. If primary maternal infection is identified, treatment in pregnancy will significantly reduce neurologic sequelae in the infected children compared with treatment commenced in the newborn period (Cortina-Borja et al. 2010).

1.4.3 Sexually transmitted infections

Sexually transmitted infections (STIs) are a major public health problem worldwide. Both the absolute numbers and the rates of acute STIs in many EU countries have been increasing since the mid-1990s. International migration may pose a particular challenge for sexual health, since individuals may arrive from, or have contact with, high STI/HIV-prevalent countries, and especially Asia and Africa, thereby increasing their own STI acquisition risk (Fenton and Lowndes 2004, Sami and Baloch 2005).

STIs are infections that are spread primarily through sexual contact. There are more than 30 different sexually transmissible bacteria, viruses and parasites. The most common infections

are gonorrhoea, chlamydial, syphilis, trichomoniasis, chancroid, genital herpes, genital warts, and HIV and HBV infections. Several of these, and in particular HIV, HBV and syphilis, can also be transmitted from mother to child during pregnancy and delivery, and through blood products and tissue transfer (World Health Organization 2010). The prevalence of STIs in Pakistan is low (Mir et al. 2009). In Norway, the more typical STIs such as syphilis and gonorrhoea occur only rarely, while HSV type 2 (HSV- 2), *C. trachomatis* and human papillomavirus (HPV) are prevalent, especially in younger people (Norwegian Institute of Public Health 2009).

There are ethnic variations in sexual health, and race and socioeconomic status are not sufficient to explain these differences (Santelli et al. 2000). Unprotected sexual contact is a factor that raises many psychosocial questions, namely those concerning migration and social integration. Many EU countries require immigrant workers to travel alone and leave their spouses and partners behind. This almost inevitably, places immigrants at risk of unsafe sexual behaviour, and contact with sex workers. In Belgium, Sweden and Germany the incidence of STIs is higher among immigrants than among nationals. Conversely, in Italy the risk among immigrant populations appears to be lower (Carballo and Nerukar 2001).

Variations in the incidence of STIs have also been described within some immigrant and ethnic-minority communities in some EU states, reflecting a high disease prevalence in their countries of origin, a higher prevalence of risk behaviours and generally poor access to culturally appropriate STI prevention and treatment services. Moreover, many EU states continue to experience evolving commercial sex networks and illegal drug use. These will continue to offer new risks for STI transmission (Fenton and Lowndes 2004).

Nordic countries have succeeded in controlling gonorrhoea and syphilis, and have low incidence rates of HIV and hepatitis infection. However, the incidence of all STIs has increased in recent years (Moi 2001).

Chlamydia

C. trachomatis which was discovered in 1959, is a major cause of ocular and pelvic STIs worldwide (Norwegian Institute of Public Health 2009). Women experience the most severe consequences of untreated infection, including pelvic inflammatory disease, chronic pelvic pain, ectopic pregnancy and tubal infertility. Most chlamydial infections are asymptomatic.

Chlamydia infection is the most common STI in Norway, and is probably common cause of sterility and childlessness. The newborns of infected untreated mothers may develop eye

infection (ophthalmia neonatorum) or lung infection, which may become apparent some weeks after birth (Norwegian Institute of Public Health2009). A study in Pakistan did not find any case of chlamydia among urban men (Mir et al. 2009). However, the chlamydial infection rates among pregnant and non-pregnant women with urogenital problems in Pakistan were 11.8 % and 14.7 %, respectively (Somji et al. 1991). In Norway, 9−11% of the 84% of females younger than 25 years who have been tested were seropositive for chlamydia, while 21% of the 44% young adult males tested were seropositive (Bakken et al. 2006). Screening before induced abortion, and screening of pregnant women younger than 25 years and women attending family planning-institutions are effective ways to control chlamydia infection in Norway.

Herpes genitalis

Herpes genitalis is a chronic STI that is caused mainly by HSV-2, while infection with HSV-type 1 (HSV-1) is responsible for oral herpes. Genital herpes was first described in 1700, and HSV was identified in 1919. The infection usually manifests with painful localized vesicles in the mucosa and skin, and a fever. After primary infection, HSV lies latent in nerve roots, and in half of cases reactivation occurs under special circumstances, such as illness or stress. It can be transmitted from person-to-person without active lesions. HSV-1 infection, which is currently on the increase, is a childhood disease with up to 80% being infected. HSV-2 infection is less common, but up to 20−40% of those aged 20−40 years may be infected. HSV-2 is the leading cause of genital ulcer disease worldwide and can sometimes cause encephalitis and meningitis in immunocompetent persons (Norwegian Institute of Public Health 2009). A study involving pregnant Zimbabwean women showed that the prevalence of HSV-2 among the HIV seropositive population was high (89.3%) (Munjoma et al. 2010).

A serious consequence of HSV-2 infection is that the virus can be transmitted from an infected mother to her baby, usually through an infected birth canal. Typically 30−50% of babies may be infected if the mother acquires primary infection with HVS-2 around the time of birth. Acyclovir and Caesarean section are recommended if primary infection occurs after 35 gestational weeks. Neonatal infection may be devastating, resulting in diseases localized to the skin, eyes or mouth, meningoencephalitis, severe pneumonitis or acute liver failure (Read et al. 2008). Without early treatment, about 30% of infected children will die, and about 20% will survive with neurological complications.

Herpes genitalis is common worldwide. The prevalence of HSV-2 was reported to be 3.4% among urban men in Pakistan (Mir et al. 2009), 17% among Norwegian STI patients, and 4%, 7% and 14 % in Norwegian medical students, blood donors and pregnant women respectively (Nilsen et al. 2005).

Hepatitis B

In 1965, Blumberg discovered the hepatitis B surface antigen (HBsAg), also known as the Australia antigen, and its antibody, hepatitis B surface antibody, the virus that causes HBV infection (Pyrsopoulos 2011). HBV is a major health problem, leading to significant mortality worldwide especially in the developing countries including Pakistan (Alam et al. 2007). The HBV infection rate is increasing daily in Pakistan, which may be due the lack of proper health facilities, poor socioeconomical status, or low public awareness about the transmission of major communicable infections such as HBV, hepatitis C virus and HIV (Alam et al. 2007). It has been estimated that one-third of the global population has been infected with HBV (Figure 3) with approximately 350 million people being lifelong carriers. Ongoing vaccination programmes appear to be decreasing the prevalence of HBV (Pyrsopoulos 2011).

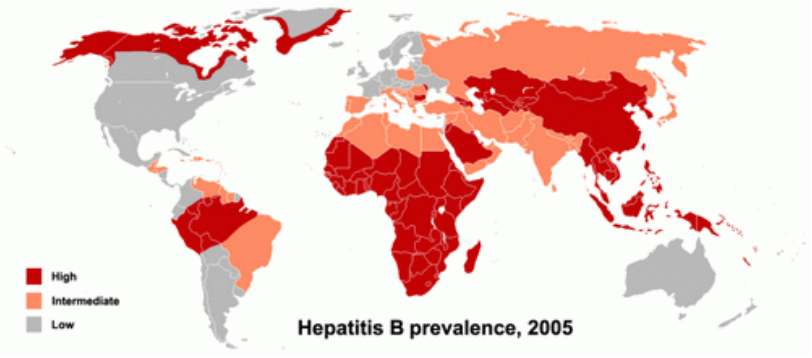

Figure 3. Worldwide hepatitis B virus prevalence in 2005

HBV can lead to acute and chronic hepatitis, and to hepatocellular carcinoma, especially in chronic carriers (Norwegian Institute of Public Health 2009). HBV is transmitted haematogenously and sexually. The infection may result from infectious fluids coming into contact with mucuos membranes or open wounds (including very minor lesions) on the skin. Mother to child transmission most often occurs through foetal exposure to blood at birth.

Such perinatal transmission is believed to account for 35−50% of hepatitis B carriers. The risk of perinatal transmission is associated with the hepatitis B e antigen (HBeAg) status of the mother. Without neonatal prophylaxis, 70−90% of neonates with mothers who are both HBsAg and HBeAg seropositive will become chronically infected (i.e.."carriers" of the virus), while the risk of transmission is usually significantly lower, if the mother is positive for HBsAg but negative for HBeAg (Lee et al. 2006). In Pakistan, like in many other developing countries, more than 80% of deliveries are conducted by traditional birth attendants in unhygienic conditions and without proper sterilization, which renders the mothers more vulnerable to HBV and hepatitis C virus infection (Chaudhary et al. 2005).

In Pakistan, 2.4% of children and healthy adults are carriers of HBeAg (Ali et al. 2009).

Kazmi found that 4% of Pakistani pregnant women were seropositive for HBsAg, and that HBsAg did not cross the placental barrier (Kazmi et al. 2003). Hepatitis B carriership is rare among ethnic Norwegians (<0.5%): 95% of the newly detected chronic carriers in 2009 were of foreign origins, and the most common countries of origin in 2003 were Somalia, Vietnam, Thailand, Afghanistan and China (Norwegian Institute of Public Health 2009).

A significant proportion of immigrant women are carriers of the HBsAg. In Australia, women from Europe, Asia, the Middle East, New Zealand/Oceania and Africa were 2−27 times more likely to be HBV-positive compared with mothers born in Australia (Ma and Bauman 1996).

Neonatal vaccination has been introduced worldwide, mostly without screening of the mothers. Screening of pregnant women is offered to defined at risk groups in Norway, including immigrants from countries where HBV is common. Specific immunoglobulin IgG and vaccine are offered to newborns of HBV-positive mothers directly after delivery.

Health workers at maternity wards are exposed to infection through blood and amniotic fluid, and should therefore be offered HBV vaccination.

1.5. Preventing infections in pregnancy

1.5.1 Primary prevention

Pre-pregnancy testing and counseling

The woman and her partner should consult their general practitioner when planning pregnancy. Pre-pregnancy testing should include those tests offered in routine antenatal screening programmes . Women who are negative for rubella or varicella IgG should be

offered the measles-mumps-rubella (MMR) and varicella vaccine. Women who receive the MMR vaccine should be retested for rubella IgG after 2 months and revaccinated if necessary. Varicella vaccine is given in two doses, 2 months apart, and pregnancy should be postponed for at least 3 months after the second dose (Gilbert 2002, Norwegian Institute of Public Health 2008).

Antenatal screening

All pregnant women in Norway are offered testing for HIV and syphilis, and immigrant women originating from epidemic HBV areas are also offered testing for HBsAg. Testing for hepatitis B core antibody (anti-HBc) should also be recommended.

In some other countries antenatal screening includes testing for varicella IgG antibodies, CMV antibodies and repeated toxoplasma testing (Gilbert 2002). However, this is not routine in Norway.

Women in close contact with toddlers may be at increased risk of CMV infection during pregnancy. We recommend that routine CMV antibody testing in pregnancy should not be included in the antenatal infectious panel in Norway.

To reduce the risk of toxoplasma infection, women should have good kitchen hygiene, avoid raw or undercooked fresh meat, peel or wash raw fruit and vegetables thoroughly to remove contaminating soil, wash hands or wear gloves while disposing of cat litter or gardening, and avoid travelling to high-prevalence countries during pregnancy (Gilbert 2002).

1.5.2 Secondary prevention

Possible or confirmed exposure

If a pregnant woman is exposed to an infection known to be transmissible to the foetus or neonate, she should be tested as soon as possible to determine her susceptibility. If she is susceptible, then determining the basis for diagnosis may help in assessing the risk of infection. Serological testing should be repeated up to 3 weeks after exposure to detect seroconversion. Immunoprophylaxis is available for susceptible pregnant women after exposure to varicella: however, this is not used in Norway. Pregnant women who have sexual contact with a man with an STI should be tested for other STIs, even if routine antenatal screening has already been performed (Gilbert 2002).

Presentation of symptoms

Symptoms of infection in pregnant women should be investigated unless the cause is obvious. Diagnosis may be based on clinical symptoms and confirmatory laboratory results, a history of compatible clinical symptoms only or serological evidence only (Gilbert 2002).

Proven infection

If an infection is confirmed or cannot be excluded in a pregnant woman, the risk to the foetus depends on the stage of pregnancy and the type of infection. Appropriate investigations including prenatal diagnosis, and expert advice are essential before interventions such as TOP or administration of potentially toxic drugs are considered (Gilbert 2002).

1.6 Post-partum depression

Women have an increased risk of a first onset of major depression from early adolescence until their mid-50s, and their lifetime rate of major depression is 1.7 to 2.7 times higher than that of men. The risk of depression increases in some periods of a woman's life, including the post-natal period (Burt and Stein 2002). Mental-health diseases are frequent complications associated with pregnancy and childbirth (Brockington 2004). Unipolar depression is the most common type, but bipolar affected illness, obsessional disorders and anxiety may also occur, and represent a considerable health problem that affects not only the women themselves but also their children and families (Brockington 2004).

There are three post-partum psychiatric disorders: maternity blues, puerperal psychosis and post-natal depression (Brockington 2004). Post-partum psychosis is generally defined as any mental disorder occurring within 3 months after childbirth and that is serious enough to require admission to a psychiatric facility (Brockington 2004).

Postpartum depression generally occurs within 6−8 weeks after childbirth (Patel et al. 2002). It is a significant public health problem with reported prevalence rates typically varying from 4.9% to 28% (Chandran et al. 2002, Ho-Yen et al. 2006, Rahman et al. 2003): the prevalence is highest in Chile (50.7%) (Poo et al. 2008), while a meta-analysis has shown an average prevalence of 13% in the general population (O'Hara and Swain 1996). An international study that explored levels of post-partum depression in nine countries representing five continents showed that European and Australian women had the lowest levels, US women had intermediate levels, and women from Asia and South America had the highest levels of

depressive symptoms (Affonso et al. 2000). Pakistani pregnant women who had anxiety/depression or had experienced verbal or physical/sexual abuse were significantly more likely to have suicidal thoughts and attempts (Asad et al. 2010).

The following risk factors for post-partum depression have been described:

- Psychological disorder during pregnancy (O'Hara and Swain 1996).
- Past history of psychological disorder (O'Hara and Swain 1996).
- Stressful life events such as death of a loved one, relationship breakdown, divorce, or losing a job (Eberhard-Gran et al. 2002).
- Poor marital relationship (Eberhard-Gran et al. 2002).
- Relationship difficulties with mother-in-law and or parents (Chandran et al. 2002).
- Lack of physical help (Chandran et al. 2002).
- Obstetric factors such as early discharge from the maternity wards (Hickey et al. 1997).
- Low socioeconomic status, (O'Hara and Swain 1996), low education and illiteracy (Irfan and Badar 2003), financial difficulties and low sociaeconomic class (Chandran et al. 2002, Irfan and Badar 2003).
- Young age (Irfan and Badar 2003), primiparity (Irfan and Badar 2003), being single (Kendell et al. 1987), high parity (Khooharo et al. 2010), birth of a daughter when a son was desired (Chandran et al. 2002, Patel et al. 2002), as well as being an immigrant (Small et al. 2003).
- Receiving social support through friends and relatives during stressful times and university education are thought to be protective factor against developing depression (Grussu and Quatraro 2009). Public post-natal care lowered the risk of postpartum depression (MacArthur et al. 2002).

1.7 Human leucocyte antigen class II genetics of Pakistani immigrants

1.7.1 The human leucocyte antigen system

The genetic loci involved in the rejection of foreign organs are known as the major histocompatibility complex (MHC), and this encodes highly polymorphic cell surface molecules. The human MHC is called the human leucocyte antigen (HLA) system because these antigens were first identified and characterized using alloantibodies against leucocytes (Terasaki 1990). Leucocyte-agglutinating antibodies were observed in the sera of multiparous women

and previously transfused patients. Graft rejection was found to be associated with the development of antibodies against allogenic leucocytes**.** The HLA system is welll known to include transplantation antigens, but the primary biological role of HLA molecules is regulating immune responses (Robinson et al. 2003)**.**

Genomic organization of the HLA system

The human MHC maps to the short arm of chromosome 6 (6p21) and spans approximately 3.6000 kilobases of DNA (Robinson et al. 2009). The human MHC is divided into three regions: classes I-III (Figure 4). The class I region contains the classical HLA-A, HLA-B, and HLA-C- genes that encode the heavy chain of class I molecules. The class II region consists of a series of sub-regions, each containing A and B genes encoding α and β chains, respectively (Middleton et al. 2009). The DR gene family consists of a single DRA gene and up to nine DRB genes (DRB1-DRB9). The DRA gene encodes an invariable α chain and it binds various β chains encoded by the DRB genes. The DQ family each has one expressed gene for α and β chains and additional unexpressed pseudogenes. The DQA1 and DQB1 gene products associate to form DQ molecules. The class III region does not form HLA molecules, but contains genes for complement components (C2, C4 and factor B), 21-hydroxylase, tumour necrosis factors, and some others (Robinson et al. 2009).

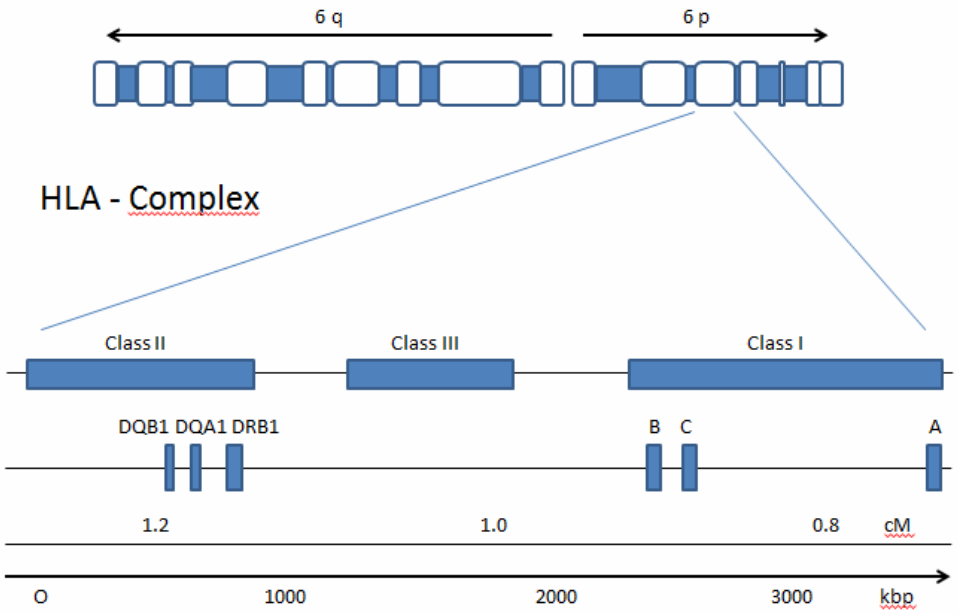

Figure 4. Map of the human leucocyte antigen (HLA) complex on human chromosome 6. The long and short arms are designed as 6q and 6p respectively. The different gene classes of the HLA complex are indicated as solid bars. The classical HLA class I genes A, B and C, and the genes typed for in this thesis are presented as solid bars. The scales indicate the genetic distance in centimorgans (cM) as well as the physical extension in kilobase pairs (kbp).

HLA nomenclature

The HLA nomenclature has changed four times during the last 30 years. For researchers in other fields this represents a greater difficulty than compared to the increasing number of new genes (loci) and their alleles. In the summer 2010 it was decided that the earlier nomenclature should be extended so that, for example, the earlier DRB1*030101 allele was changed to DRB1*03:01:01. The two last digits represent a nucleotide substitution that does not cause any difference in amino acid difference.

HLA haplotypes

HLA genes are closely linked, and the entire MHC is inherited as an HLA haplotype in a Mendelian fashion from each parent. The segregation of HLA haplotypes within a family can be assigned by HLA family studies. Two siblings have a 25% chance of being genotypically HLA identical, and a 50% chance of being HLA haploidentical (sharing one haplotype), and a 25% chance that they share no HLA haplotype. There is an enormous number of possible random recombinations of alleles from different HLA loci on an HLA haplotype, but certain

HLA haplotypes are found more frequently than might be expected by chance. This phenomenon is called Iinkage disequilibrium. For example HLA-DRB1*03-DAQ1*05-DQB1*02 is close to 100% inherited among Caucasians.

The HLA system is known to be the most polymorphic in humans. By October 2011 a total of 7.059 HLA alleles had been described in different populations, and among these there were 1.591 class II alleles (http://www.ebi.ac.uk/imgt/hla/stats.html).The distribution and frequency of HLA alleles vary greatly among different ethnic groups. It has been postulated that this diversity of HLA polymorphism has evolved under unique selective pressures in different geographical areas. This could be related to the role of the HLA molecules in the presentation of prevalent infectious agents in different areas of the world.

Numbers of different alleles identified worldwide for the loci typed for in this thesis are:

	DRB1	DQA1	DQB1
Alleles	1.051	46	160

1.8 Previous studies of reproductive health among Pakistani immigrants in Norway

1.8.1 Theses

There have been three PhD studies to date in Norway on reproductive health among Pakistani immigrants.

Leif Brunvand (1998) studied the influence of vitamin D deficiency among pregnant Pakistanis in Oslo and possible consequences for their infants. He found that dietary intake of vitamin D by these women was lower than the recommended level, with 40% having a severe vitamin D deficiency, and 68% having iron deficiency (serum ferritin below 12 µg/l).

He suggested that a high consumption of chapatti bread containing phytic acid could have contributed to these deficiencies. He also found that vitamin D deficiency may affect foetal growth through an effect on maternal and foetal calcium homeostasis (Brunvand 1998).

Camilla Stoltenberg (1998) studied the influence of consanguinity on the risk of stillbirth and infant death. She found that consanguinity is the main explanation for the increased risk of stillbirth and deaths within the first year of life among the children of Pakistani parents. The risk of early death was similar for non-consanguineous parents and all population groups,

nearly 30% of early deaths could be attributed to consanguinity in the Pakistani group, compared to 0.1% in the Norwegian population. The risks of birth defects, stillbirth and infant death were 6.8%, 11.1% and 7.7%, respectively, for children whose parents were first cousins. Low maternal education level was associated with an increased risk of stillbirth and infant death in the Norwegian group, but not in the Pakistani group (Stoltenberg 1998).

Finally, Siri Vangen (2002) found that the prevalence rates of type 2 diabetes and gestational diabetes, low birth-weight and perinatal death were higher among ethnic Pakistani women than in the background population. Mean birthweights were largely unrelated to perinatal mortality, which was lowest for Vietnamese and highest for Pakistanis. She suggested that other biological and environment factors should be considered to explain ethnic differences in perinatal mortality (Vangen 2002).

1.8.2 Studies of health and nutrients issues in Pakistani immigrant women

The nutritional status of immigrants has received much considerable attention. According to Pakistani women, life in Norway has led to several changes in meal patterns and compositions (Mellin-Olsen and Wandel 2005). The cultural importance of breakfast and lunch has diminished, and dinner has become the most important meal. Meals on weekends tend to be more traditional than on working days. The study gives limited support to the hypothesis that changes occur predominantly among the accessory foods and least among staples. The focus group interviews revealed a rich variety of factors influencing dietary change: health aspects, children's preferences, work schedules, social relationships, stress levels, traditional beliefs, climate, season and access to foods (Mellin-Olsen and Wandel 2005).

Vitamin D deficiency has been particularly well studied. Meyer pointed out that vitamin D deficiency was prevalent among Pakistani immigrants, and in stark contrast to the vitamin D replete Norwegians. Interestingly, serious vitamin D deficiency was not associated with reduced forearm bone density among Pakistani women (Meyer et al. 2004).

In another study, Madar found widespread vitamin D deficiency in immigrant women and their infants from Pakistan, Turkey and Somalia who were living in Norway, and this was particularly severe among exclusively breast-fed infants who did not receive vitamin D supplements (Madar et al. 2009).

Culturally adapted education has the potential to change Norwegian-Pakistani women's intentions to make their diet healthier, and to induce some beneficial, however modest, self-reported changes in diet (Johansen et al. 2010).

In 2006, a study found that food intake in middle-aged Pakistani women in Oslo was not only an isolated nutritional phenomenon but also had a socio-cultural dimension (Dawes 2006). This was expressed in the women's perceptions, which had a greater effect on their choices than did biomedical nutritional facts or information. The general messages given by health professionals, such as consuming less sugar, using plant oils, or eating more white meat, were interpreted as a overall message to start eating " poor man's food again".

2. AIMS OF THE STUDY

The main aim of the study described in this thesis was to characterize the maternal health of Pakistani immigrants in Norway.

The research focused particularly upon infections of importance for pregnancy and STIs among the Pakistani couples. Post-partum depression and the distribution of HLA class II alleles of the DRB1, DQA1 and DQB1 genes in the mother, father and child were also studied.

3. MATERIALS AND METHODS

3.1 Study population and methods

3.1.1 The study population, blood sampling and interviews

Pregnant Pakistani women were randomly recruited when they came for their prenatal ultrasound screening at 17−18 weeks of gestation in the two maternity hospitals in Oslo (Rikshospitalet and Ullevål University Hospital). Most of these women had their pre-natal and post-natal check-ups at public health centres in two regions in Oslo (Grunerløkka and Grønland). Although we had asked the midwives and their assistants to assemble the Pakistani women on one a particular day on which I could visit, quite often none or only one patient was registered, which made home visits necessary. Recruitment was stopped after 2 years, at which point 207 women were enrolled. An invitation letter and information about the study was provided in 'Urdu'. All women gave their informed consents to participate. The plan had been to collect blood or buccal samples from the 207 Pakistani women and their husbands. However, not all husbands accompanied their wives, and of those who did, not all agreed to have their blood tested. This resulted in samples being obtained from 167 men. The cord blood or buccal samples of the neonates were also collected. The blood samples, collected into ethylenediaminetetraacetic acid tubes, were centrifuged and separated, and the plasma frozen at -20^0 C.

Two face-to-face interviews were conducted: one prenatally and one 6−12 weeks after delivery. Of the 207 participants, 10 women did not attend post-partum interview, comprising 1 woman who had a late miscarriage, 2 women with stillbirths, 1 whose baby died a few days after the delivery, 3 women who had moved back to Pakistan, 1 who refused

to be interviewed, 1 who had moved to an unknown address and 1 who had been killed. This left a total of 197 women who were interviewed twice.

The questionnaire employed after birth was designed as a structured questionnaire (Eberhard-Gran 2002) which included The Edinburgh Post-natal Depression Scale (EPDS), to assess the prevalence of and risk factors for post-partum depression. The EPDS is a ten-item self-rating scale designed to identify post-natal depression (Cox et al. 1987). It is widely used and has been translated into many languages. EPDS items are related to matters such as being able to laugh, looking forward with enjoyment to things, blaming oneself unnecessarily, being anxious or worried for no good reason, felting scared or panicky for no good reason, experiencing overload, being so unhappy that it causes sleeping problems, felting miserable or sad, being so unhappy as to have cried, and experiencing thoughts of harming oneself. Each EPDS item is scored on a scale of 0 to 3, giving maximum total score of 30.

3.1.2 Testing of blood-samples for antibodies

We analysed the IgG antibodies to CMV, rubella virus, VZV, *Toxoplasma gondii, C. trachomatis,* HSV-2 and HBV. If anti-HBc IgG was present, we also analysed HBsAg and anti-HBs.

CMV IgG, rubella IgG, anti-HBc, HBsAg and anti-HBs were analysed using Chemiluminescence immunoassay (Abbott Laboratories, Abbott Park, IL, USA). VZV IgG analysis required an enzyme immunoassay (Behring Enzygnost, Dade Behring, Marburg, Germany). Toxoplasma IgG was analysed with a microparticle enzyme immunoassay from Abbott (Axsym, Abbott Laboratories). *C. trachomatis* was analysed with the SeroCT$^{tm}_{IgG}$ (Savyon Diagnostic, Ashdod, Israel). HVS-2 IgG was analysed with HerpeSelect^{R}2 Elisa IgG (FOCUS Diagnostics, Cyprus, CA, USA).

The IgG measurement were registered as “negative”, “grey zone”(meaning neither negative nor positive), “slightly positive” (meaning that specificity may be uncertain), and “positive”. In our study we regarded “grey zone” as “negative” and “slightly positive” as “positive”.

3.1.3 HLA genotyping

DNA was isolated either from peripheral blood using the FlexGene kit or from a buccal brush (Qiagen, Hilden, Germany). (Rønningen et al. 2006, Witsø et al. 2002)**.** DNA was initially genotyped for HLA class II alleles (DQA1, DQB1 and DRB1*04) using the “DELFIA Diabetes

Consumables Pack for Hybridization Assays" and probes from Perkin Elmer. All testing was conducted according to the manufacturer's instructions. The genotyping technique is based on solution hybridization with lanthanide-labelled oligonucleotide probes detected by time resolved fluometry (Nejentsev et al. 1999)**.** Since the DELFIA kits for DQA1 and DQB1 typing which were originally designed for the identification of risk genotypes for type 1 diabetes in Caucasians were used, no probes for DQA1*01 subtyping were included. The DQA1*01 alleles were determined by a selection of primer mix pairs from an HLA typing kit DQA1 bulk, using the following primer mix pairs: 1, 3, 4 and 5 (product no:101.231-24u, Olerup SSPAB, Saltsjøbaden, Sweden). Testing was conducted following a standard protocol for sequence-specific primers (Olerup O 1992). All DNA samples were sequenced for DRB1 and DQB1, using AlleleSEQR HLA kits (Abbott Laboratories, Abbot Park, Illinois, USA) and AB13730 DNA Analyzer (Applied Biosystem by Life Technologies, California, USA). Alleles were assigned based on sequencing conducted using Assign 3.5+ software (http://www.conexiogenomics.com). Hardy Weinberg equilibrium was tested at each locus (Guo and Thompson 1992). The alleles at all loci were included in the construction of haplotypes.

3.2 Variables

The subjects completed structured questionnaires before and after delivery. Information was collected regarding demographic and socioeconomic factors such as age, marital status, relationship, education level, parity, family income, employment status and years of residence in Norway.

The following data were collected:

1. *Reproductive factors and history:* Premenstrual complaints, previous miscarriages, stillbirths, mode of last delivery and breastfeeding.
2. *Somatic diseases.* Information about incidence rates during the previous year was obtained using the following checklist: asthma, hay fever/allergy, high-blood pressure, cardiovascular disease, diabetes, thyroid disease, gynecological disease, muscular/skeletal/articular disease, migraine/headache, cancer or other somatic diseases not listed above.
3. *Psychiatric history.* History of hereditary depression or previous depression.
4. *Interpersonal relationship.* It was determined whether the participant had persons outside the family who she can confide in, helps her with housework, or who can

care for the family. The answers were coded as 'yes' or 'no'. The participants were also asked about their attachment to their partner, and the answer coded as 'closely attached to partner', 'partly attached' or 'not attached at all'.

5. *Life events.* Major life events during the last 12 months, included the following items: (1) separation or divorce; (2) serious problems in marriage or cohabitation; (3) problems or conflict with family, friends or neighbours; (4) problems at work or in their place of education; (5) economic problems; (6) serious illness or injury; (7) serious illness or injury within the nuclear family or close family members; (8) traffic accident, fire or theft; (9) loss of a closely related person; and (10) other difficulties. The answers were graded according to the woman's reaction to the event as; 'not so difficult' 'difficult' or 'very difficult', and the sum of scores from each item (graded according to severity on a scale of 1 to 3) was used as a negative life event indicator (coded:'0 points', '1-5 points', or '>5 points'). The women with 0 points was considered to have reported no major events.
6. *Outcome variable.* Measures of mental health obtained. Using the EPDS were dichotomized in the statistical analyses as either high score (≥10) or low (<10) (Eberhard-Gran et al. 2002).

3.3 Statistical analyses

All data were registered in SPSS (SPSS, Chicago, IL, USA). Descriptive statistics (including means, standard deviations, frequencies, and percentages) were used to analyse the distribution of the demographic variables.

Crude adjusted odds ratios of being seropositive for rubella, VZV, toxoplasma, HBV, Chlamydia and HSV-2 with 95% confidence intervals were estimated by logistic regression analyses for potential risk factors such as maternal age, parity, family income and years of residence in Norway.

Differences in demographic and serologic results between men and women were tested with Fisher's exact test. The cut-off for statistical significance was set at $p< 0.05$. The relationship between *C. trachomatis*, HSV-2, and hepatitis B seropositivity and determined factors were estimated by logistic regression analyses and presented as crude odds ratios with 95% confidence intervals.

Crude odds ratios for being depressed (EPDS score ≥10) with 95% confidence intervals were estimated by logistic regression analyses.

4. RESULTS

4.1 Paper I

Bjerke SEY, Vangen S, Holter E, Stray-PedersenB. Infectious immune status in an obstetric population of Pakistani immigrants in Norway. *Scand J Public Health 2011;39:464–470.*

In total, 206 women were tested for seropositivity against different infections of importance for foetal wellbeing. All mothers had IgG antibodies against CMV, 92% were positive for rubella IgG, 93% had varicella IgG antibodies, and 17% were seropositive fortoxoplasma IgG. Furthermore, 11% were anti-HBc positive, and one of these mothers was also positive for HBsAg, which meant that the blood and probably cervical secretions were infectious , with a consequent risk of HBV transmission to the baby at the time of birth. Six women were only anti-HBc positive, and while they may have had only a low-level HBV infection, the risk of transmission could not be excluded. As for varicella infection: age younger than 25 years, having less than two children, and having lived less than 5 years in Norway were factors that were significantly associated with a seronegative varicella status. These women were thus susceptible to primary infection.

Recommendations of managing immigrant women with infections are presented.

4.2 Paper II

Bjerke SEY, Holter E, Vangen S, Stray-Pedersen B. Sexually transmitted infections among Pakistani pregnant women and their husbands in Norway**.** *Int J Women Health 2010;2:303–309.*

A total of 112 immigrant couples of Pakistani origin participated in this study. Pakistani women had significantly lower age, education level and years of residence in Norway compared to their male partners. Chlamydial IgG antibodies were present in 12% of the men but only 1% of the women. These couples were discordant, meaning that the 13 wives of the positive men were not infected with *C. trachomatis*, and the husband of 1 positive woman was not infected. HSV-2 seroposivity was present in 4% of the women and 2% of the men. Only one couple was concordantly positive for HVS-2, the remaining four couples were discordant. Hepatitis B infection was either currently or previous present in 12% of the women and 2% of the men.

4.3 Paper III

Bjerke SEY, Vangen S, Nordhagen R, Ytterdahl T, Magnus P, Stray-Pedersen B.

Postpartum depression among Pakistani women in Norway: prevalence and risk factors.

J. Matern Fetal Neonatal Med 2008;21:889–894.

Only 7.6% of the 197 immigrant Pakistani women were depressed post-partum, as assessed using the EPDS model. High scores on the life-event scale, a history of prior depression, single marital status, a poor relationship with their partner and age of at least 30 years were found to be significant risk factors for post-partum depression. Compared with studies of immigrant population performed in other countries, the prevalence of post-partum depression in our immigrant women seems to be low. Therefore, being a Pakistani immigrant in Norway does not seem to result in a higher risk of post-partum depression.

4.4 Paper IV

Rønningen KS, Yap SE, Brandal K, Stormyr A. Lie BA, Rasmussen T, Stray-Pedersen B, Akselsen HE. HLA-DRB1, -DQA1 and –DQB1 alleles and haplotypes in first generation Pakistani immigrants in Norway. *Scand J Immunol, in press, 2012.*

In 179 unrelated Pakistani pregnant women and men (husbands and those other relatives were excluded, either the mother or the father of related couples were excluded), we identified 25 DRB1, 9 DQA1 and 14 DRB1 alleles. The most frequent alleles were DRB1*03:01:01 (15.9%) and DRB1:07:01:01 (15.9%), DQA1*01:03 (22.1%) and DQB1*02:01:01 (26.0%). As for haplotypes 41% were identified, including DRB1:13:02:02-DQA1*01:02-DQB1*06:03:0a, which has not been reported previously. However, the allele frequencies did not differ significantly between unrelated parents and all parents genotyped, confirming that consanguineous marriage is common in Pakistan.

5. DISCUSSION

This is the fourth study for a PhD thesis that has investigated immigrant pregnant women in Norway. Pakistani immigrants exhibit different patterns of infection compared to Norwegians. Pakistani mothers are less depressed post-partum. We confirm that consangenious marriage is common in the Pakistani population.

5.1 Main findings

In comparison to ethnic Norwegians: Pakistani immigrant mothers have higher prevalence rates of CMV, toxoplasma and HBV infection, but a lower prevalence of STIs, it is striking that most couples are discordants. The prevalence of post-partum depression was slightly lower than that found in previous study of ethnic Norwegians, with different risk factors being identified (being single, being primiparous and not having breastfed).

HLA analysis revealed: no significant differences in allele frequencies between unrelated and related couples.

5.1.1 Communicable infections

Cytomegalovirus

All Pakistani immigrants in our study carried antibodies against CMV, compared to 72% of the Norwegian pregnant population (Eskild et al. 2005). This is surprising given that only 16.5% pregnant women in Pakistan were reportedly seropositive against CMV (Shams et al. 2011). Our results indicate that routine CMV antibody screening of pregnant women to identify those at risk of primary infection in pregnancy cannot be recommended. This is due to three main reasons: (1) it is not possible to identify foetuses at risk, (2) the lack of treatment opportunities and (3) the cost of screening (Landini and Lazzarroto 1999, Odland et al. 2001). Our conclusion is in agreement with this. Some countries recommend urine and dried blood-spot testing of newborns (Barbi et al. 2008, Foulon et al. 2008). Treatment of pregnant women with CMV hyperimmuneglobulin E has shown promising results, but the efficacy of this treatment option has not been studied in randomized controlled trials (Nyholm and Schleiss 2010). Education on methods to prevent CMV transmission should be encouraged, particularly among young women of child-bearing age. The main problem with CMV is that it is remains a difficult disease to prevent. It is hoped that a vaccine to prevent CMV will be developed in the future, which remains a major public health priority (Nyholm and Schleiss 2010). Another problem is that reactivations can sometimes occur in

seropositive women and especially in populations with a high prevalence of infections. Detection of this reinfection is difficult.

Rubella

In our study only 8% of the Pakistani immigrants were seronegative for rubella, this is comparable to a rate of 5−10% among ethnic Norwegians, which contrasts with rates of 18% and 39% among pregnant women in Karachi (Ahmed et al. 2006), and Islamabad (Adil et al. 2005), respectively. Vaccination against rubella was introduced in 1978 in Norway, whereas most immigrant women are not vaccinated in their home countries (Stray-Pedersen 1997). In Australia, although the current rubella immunization is effective and provides protection for most Australian-born women, immigrant women from countries where rubella vaccination is not widely practiced still have very high susceptibility to this disease (Francis et al. 2003). Among our 17 women who were seronegative for rubella, 11 had more than one child, only 2 of these women had delivered their children in Pakistan. We would expect the remaining 9 women to be seropositive for rubella IgG, since Norwegian maternity hospitals offers the rubella vaccine to rubella-seronegative women.It is possible that the rubella status was not checked in pregnancy, the vaccine was not given to these women, or, more unlikely, these women were vaccine non-responders. Greater attention should be paid to rubella testing of our immigrants, with immediate vaccination of those who are seronegatives.

Preventive measures must be taken to decrease the mortality and morbidity related to congenital rubella infections. Rubella-susceptible women immigrating from outside Europe have been identified as an important target group for immunization. Programmes to immunize newly arrived women and adolescent girls are necessary, because they are at risk of contracting rubella and may give birth to an infant with congenital rubella syndrome in high-prevalence countries that do not have a rubella immunization programme (Eurosurveillance 2009).

Varicella

We found that only 14 (7%) of the women were seronegative for VZV IgG. We expected a higher proportion of VZV negativity, since varicella is not common in South-East Asia. Young age (under 25 years), having less than two children and residing for less than 5 years in Norway, were factors associated with susceptibility to VZV. Thus, women might become infected in Norway, through their children or surroundings. VZV infections occur worldwide, but spread less readily in countries with a tropical climate than in those with a temperate

climate, resulting in higher rates of susceptibility to varicella in adults in tropical countries than in countries with colder climates (Kjersem and Jepsen 1990). Physicians should therefore consider testing for varicella immunity in their obstetric patients born in tropical or subtropical regions (Golberg and Ziel 2002). Preconceptional testing and vaccination are recommended to prevent maternal infection and have been introduced by several physicians (Gardella and Brown 2007). Safe and effective vaccines against VZV have been available in Europe for the last 5−10 years. The USA has had a universal childhood vaccination policy since 1995, and this has dramatically decreased the incidence, morbidity and mortality rates associated with varicella. Furthermore, Japan and South Korea have programmes for childhood vaccination against varicella (The Norwegian Drug Bulletin 1999).

The Society of Independent European Vaccination Experts recommends that the immunization of susceptible adolescents needs to be urgently implemented, in addition to the current recommendations targeting high-risk patients, their close contacts with a negative history of varicella and seronegative health-care workers (Sengupta et al. 2008). In some European countries (Denmark, Iceland, Ireland, Northern Ireland, Norway, Sweden, Switzerland and Turkey), varicella disease is not currently under surveillance (Eurosurveillance 2009).

Toxoplasma

The prevalence of toxoplasma infection in our immigrant Pakistani cohort was 17%, a level that does not reflect the situation in their home country, since the seropositivity for toxoplasmosis among pregnant women was reported 63% in Punjab (Bari and Khan 1990), and 32.4% in Khyber Pukhtoonkha (Shams et al. 2011). The overall seropositivity rate among women of reproductive age is 10.0% in Norway (Jenum et al. 1998), and this has been reported to be higher among women with foreign names (at 22.6%) than among ethnic Norwegians (Jenum et al. 1998).

Screening for antibodies against *T. gondii* in pregnancy has been considered in many countries. The health authorities in France and Austria have recommended such screening (Joss et al. 1990), whereas The Institute of Public Health in Norway has discouraged routine testing for toxoplasmosis in pregnancy since 1997 following the results of a large-scale toxoplasmosis study (Hareide 1997). Even so, 81% of pregnant women continue to be tested (Eskild et al. 2003). It is suggested that the routines introduced in large-scale study of *T.gondii* infection are difficult to change. Indeed, some doctors may believe that such studies

are still ongoing. Another possible explanation for the high level of testing is that the doctors or the pregnant women believe in the preventive benefit of identifying women at risk, or treating women with current infection (Eskild et al. 2003). The high prevalence found in "warm countries" compared to "cold countries" may be explained by the influence of the climate on the survival of toxoplasma oocytes in the environment (Montoya and Liesenfeld 2004). Thus, seronegative immigrant women from a country of origin with a high prevalence of toxoplasma should be advised to be tested in pregnancy, and if found to be negative, they should postpone their visit to their home country until after the child is born (Montaya and Liesenfeld 2004). If they travel during pregnancy, they should be advised to be tested 3 weeks after the infectious exposure. Minimizing the risk of the late complications, that can follow congenital toxoplasmosis, requires the treatment of primary toxoplasma infection in pregnant women and the treatment of infected newborns (Noorbakhsh et al. 2008).

5.1.2 Sexually transmitted infections

Most of the Pakistani women in our study came to Norway for marriages. We did not ask about their husbands' sexual behaviours. All positive cases of chlamydia occurred among discordant couples. IgG antibodies were found in 12% of the men but only 1 % of the woman. In only one couple were both partners positive for HSV-2, the remaining four couples were discordant. HSV-2 seroposivity was found in 4% of the women and 2% of the men. All 15 hepatitis B-affected couples were discordant.

Our findings indicate that the much lower prevalence of *C.trachomatis* infection is much lower among both women and men of Pakistani origin than among the general population of Norway, where the reported prevalence is 9−11% for women aged 15−24 years, and 21% for men aged 20−24 years (Bakken et al. 2006). Most couples were discordant with more men than women having experienced *C. trachomatis* infection. They might be due to the men having had earlier sexual experiences before marriage, while the women may not have had (or may not be concurrently having) sexual experiences. A man might have either *C.trachomatis* infection before the marriage that had cleared, or had had it during the marriage and that it had been cleared before being transmitted to his wife.

The prevalence of HSV-2 seropositivity was low among both women and men. In Norway, the prevalence of HSV-2 was reported to be 17% in STI patients and 14% in pregnant women (Nilsen et al. 2005).

Ethnic variations in the rate of diagnosed STIs have been reported in many developed countries. In Pakistan, 3.4 % of pregnant women were reportedly seropositive (Shams et al. 2011). The prevalence of STIs diagnoses was lower among Indian and Pakistani women and men than among black Caribbeans and black Africans in Great Britain (Fenton et al. 2005).

Young and unmarried women who live in the highlands or mountainous areas of Vietnam demonstrated very low levels of STI knowledge (Lan et al. 2009). Individual sexual behaviour is a key determinant of STI transmission risk, but this alone does not explain the varation of the risk across ethnic groups. There is a need for targeted and culturally competent preventive interventions (Fenton et al. 2005). Studies of STIs among immigrants in Europe focus mainly on HIV rather than the more common STIs (Cuniato et al. 2001). Significant geographical differences were found in the seroprevalence of HSV-2 antibodies among pregnant women in the Netherlands, and these differences were attributed to ethnic variations (Gaytant et ak. 2002).

Hepatitis B

In our study, only one woman - who was 31 years old, expecting her fourth child, and had lived in Norway for 10 years, was seropositive for HBsAg, which meant that her blood and probably cervical secretions were infectious, with a risk of virus transmission to the baby at the time of birth. Six women between 20 and 34 years of age, who had been resident in Norway between 1 to 12 years, were anti-HBc positive, which might indicate that they had a low-level HBV infection, and the risk of transmission could not be excluded. One of these women was expecting her first child, three were expecting their second child, the remaining two were expecting their third and sixth children, respectively. Our results indicate that HBV infection - with the associated risk of transmission to the newborn - is more prevalent among Pakistani immigrants than among the ethnic population of Norway. The average prevalence of hepatitis B antigen in Pakistan was reported to be 2.4% (Ali et al. 2009, Jafri et al. 2006), which is within the same range as among our Pakistani immigrants.

It is known that the reuse of needles and syringes for therapeutic injections without prior sterilization has been implicated in developing countries as a vehicle for the transmission of blood-borne organisms including HBV (Chaudhary et al. 2005, Ko et al. 1991). However,all needles and syringes used in medical practice and vaccination programmes in Nordic countries are disposables. There is evidence that intrafamilial transmission of HBV is

associated with the presence of more than one HBV carrier in the family and the shared use of toothbrushes among household contacts (Lobato et al. 2008).

In 1991, the World Health Organization recommended all member countries to introduce an HBV vaccine into their national vaccination programmes. HBV vaccination is not included in the Norwegian public vaccination programme since Norway is considered to have a low prevalence of HBV infection. In 2005 the Norwegian Institute of Public Health estimated that there were 12000−15000 HBV carriers (representing <0.1% of the population) in Norway. These largely comprise immigrants from high- and middle-endemic areas, plus injection addicts. Today, the HBV vaccine is given to neonates whose parents originate from countries with a high prevalence of hepatitis B, and specifically to newborns of mothers who are HbsAg-positive and those who are anti-HBc-positive and negative for HbsAg and Anti-HBs (Norwegian Institute of Public Health 2007).

However, a Norwegian working group recently suggested that HBV vaccination should be included in national programme (Norwegian Institute of Public Health 2008). Nevertheless, since global travel is common, especially among immigrants who visit their home countries, the HBV vaccine should be given to all newborns of the immigrant population regardless of the maternal HBsAg status.

Mother-to- child transmission (MTCT)

Many of the common infections that can be transmitted from mother to child during pregnancy and childbirth can be prevented. Antenatal screening programmes for rubella, toxoplasma infection and varicella can detect women at risk and offer treatment to both mother and child in identified cases. With regard to rubella and varicella, maternal vaccination programmes after birth are offered to protect against infection in subsequent pregnancies. Vaccination of newborns in cases at high risk of hepatitis B is another option.

5.1.2 Post-partum depression

The prevalence of post-partum depression was 7.6% among our cohort, which is slightly lower than of 8.9% reported for ethnic Norwegians (Eberhard-Gran et al. 2002). The prevalence found in the current study was lower than those found for immigrants in other countries. The Pakistani immigrants in Norway represent a minority group whose culture differs hugely from that of the ethnic Norwegians, and they may feel highly alienated from their Norwegian counterparts. In addition, the reported rates of prenatal and post-partum depression in Pakistan have been reported as high as 28 to 41% (Khooharo et al. 2010,

Rahman et al. 2003). Thus, we might expect a higher prevalence of depression in this group compared with ethnic Norwegians, but actually found the opposite result.

Depression around childbirth is a serious public health problem in South Asia, affecting about one in four women (Patel et al. 2002). In Pakistan, women who are poor and have more psychological symptoms during pregnancy are more likely to remain depressed 1 year after giving birth (Rahman and Creed 2007).

Many previous studies have identified risk factors for post-partum depression similar to those revealed in this study (i.e. previous psychiatric illness, poor relationship with the partner or high stress of life-events).

The tool used in the present study, the EPDS is based on self-rating, which requires the women respondents to be able to read, understand and mark their responses on the questionnaire correspondingly. This is not possible for an illiterate person. In an interview situation, there could also be a risk of under reporting psychiatric symptoms (Ho-Yen et al. 2006). Kirmayer showed that disturbances in mood, effect and anxiety are not viewed as mental-health problems in many cultures, but rather as problems of a social or moral nature (Kirmayer 2001). It is possible that immigrant Pakistani women did not perceive their depression as a mental problem.

A study involving ethnic Norwegians found that the risk factors were being primiparous, not having breastfed, having a prior depression, poor attachment to a partner and high stress of life-events (Eberhard-Gran et al. 2002). Our Pakistani immigrants shared some of risk factors in common with ethnic Norwegians: prior depression, poor attachment to partner and high stress of life-events. Almost everyone with post-partum depression (13 out of 15) had previously suffered from a traumatic lift-event. The same risk factor was founded in Pakistan (Rahman and Creed 2007).

Previous psychiatric illness (Eberhard-Gran et al. 2002, Ho-Yen et al. 2007, Irfan and Badar 2003,) and depression during pregnancy were reported as risk factors for post-partum depression (Ho-Yen et al. 2007, Rahman and Creed 2007). In our study all women with prior depression, suffered from post-partum depression. Previous experience of post-partum depression is also considered as a risk factor in Pakistan (Khooharo et al. 2010).

Rahman highlighted the need to develop mechanisms of early identification and suitable psychosocial interventions to minimize the damaging effects of persistent post-natal depression in poor communities. Prolonged maternal depression has various consequences

not only for the mother but also for the growth and development of the infant (Rahman and Creed 2007).

Social isolation and a poor relationship with a partner and the partner's parents have been shown to be risk factors for post-partum depression (Chandran et al. 2002).

In a British study, Pakistani mothers living in extended families were more depressed and anxious than those in nuclear families (Shah and Sonuga-Barke 1995). Perhaps Pakistani women in Norway did not feel socially isolated, because one-third lived in extended families and none of these reported depression, in contrast to Pakistani women in their country of origin, reporting post-partum depression (Khooharo et al. 2010).

However, a poor attachment to their partner was the risk factor in our study and in an ethnic Norwegian study (Eberhard-Gran et al.2002), and in Pakistan (Khooharo et al. 2010).

Being single is a well- known risk factor for this condition (Kendell et al. 1987). From a traditional and cultural standpoint, being a single mother is even worse and is considered to be shameful in Asia. We confirmed this risk factor in three out of five women in this category in our study. This is in contrast to the situation in Norway, where being a single mother is no longer considered a burden (Eberhard-Gran et al. 2002).

Women who lose offspring by miscarriage or stillbirth are at risk of developing post-partum major depression (Miller 2002). Among our Pakistani women, two suffered from stillbirth in the current pregnancy, but they were excluded from the post-partum questionnaire. Eight women (4%) had a history of previous stillbirths, and 25% of them were depressed. However, this is not a statistically significant result since this represents a single subject due to our study not being sufficient large to properly investigate such rare events.

Mothers of preterm infants have higher risk of depression than mothers of term infants in the immediate post-partum period, with continued risk throughout the first post-partum year for mothers of very-low-birth-weight infants (Vigod et al. 2010).

Breastfeeding did not influence post-partum depression in our study. This is in contrast to the study by Alder, wherein mothers exclusively breastfed their babies for at least 12 weeks, or who were taking contraceptives, had a higher incidence of post-partum depression than those who were not 'on the pill' or who partially breastfed (Alder and Cox 1993). Post-partum depression has been shown to have a significant negative impact on breastfeeding duration in other studies (Misri et al. 1997).

In previous studies, the risk of post-partum depression was attributed mainly to socio-economic and family variables (Chandran et al. 2002): young age (Irfan and Badar 2003), high parity (Ho-Yen et al. 2007), the gender of the child (female) (Chandran et al. 2002), low education and illiteracy (Irfan and Badar 2003), financial difficulties and low socioeconomic status (Irfan and Badar 2003), being a housewife (Irfan and Badar 2003), being an immigrant (Small et al. 2003). These factors were not associated with post-partum depression among the Pakistani women in our study. However, in Pakistan: young age (Khooharo et al. 2010), low level of education (Khooharo et al. 2010), lower socioeconomic status (Khooharo et al. 2010, Rahman and Creed 2007), having 5 or more children (Rahman and Creed 2007), lack of a confidant or friend (Rahman and Creed 2007), domestic violence (Khooharo et al. 2010) and housewives (Khooharo et al. 2010) were reported as risk factors.

5.1.3 HLA class II genetics

The present study has revealed the first extensive HLA-DRB1,-DQA1 and –DQB1 alleles and haplotype data from a major group of immigrants in Norway, first-generation immigrants from the Punjab province of Pakistan. The reason for the differences in the resolution for DRB1, DQA1 and DQB1 was that from the initiation of the study, only DQA1 and DQB1 genotyping kits designed for type 1 diabetes risk in Caucasians being used. All DRB1 alleles were therefore sequenced as well as DQB1 alleles.

Pakistan has provided Western countries access to the Indo-Pak subcontinent for millennia. On cultural and linguistic grounds, its population comprises approximately 18 major ethnic groups (Ansari 1996, Caroe 1992, Meyer et al. 2007, Mughal 1991, Rose 1991, Yuliwulandari et al. 2009). Some of the suggested origins are Syrians, North Iranians, West Asians, Turko-Iranians, Scythians, Alexander's army, Dards, Pamirs, Greeks, Slava and Jewish.

Many of those living in Pakistan as well as immigrants to other countries do therefore have mixed ancestors.

Two previously published articles have considered the distribution of HLA allelles in unrelated healthy individuals in Pakistan (Moatteret al. 2010, Mohyuddin et al. 2002). However, this thesis is the first to present data from high resolution HLA typing with four digits resolution for both DRB1 and DQB1 alleles in addition to subtyping for DQA1*01. Furthermore, it was possible to base the newborns' haplotypes on complete HLA-DRB1-DQA1-DQB1 haplotypes in this Pakistani Birth Cohort.

Mohyuddin and co-workers presented HLA genotyping data from six Pakistani regions: Baloch, Brahui, Burusho, Kalash, Pathan and Sindhi (Mohyuddin et al. 2002). These regions represent different parts of Pakistan, from those with mostly Western or mixed ethnicity, to those dominated by oriental ethnicity. Among these the group from Pathan were found to be the most similar to the Norwegian immigrants from Punjab with respect to distributions of the main DRB1, DQA1 and DQB1 groups. DRB1*07 was found in 13.0% of Norwegian immigrants from Punjab, and in 13.8% of those from Pathans. DRB1*11 was found in 13.0% of Punjabs and in 11.1% of Pathans, while DRB1*13 was found in 13% and 11.11 %, respectively. In addition, DRB1*03 is more similar in frequency among Pathans than the other groups presented by Mohyuddin and co-workers, in 17% found of those from Pathans and in 8.6% of Punjabi immigrants in Norway. The same result was found for less common alleles, such as DRB1*10, 5.5% in Punjabis and 5.0% in Pathans. For DQB1, the picture is more divergent, but for the most frequent alleles the findings were similar for people from Punjab and Pathan. A direct comparison for DQB1 is also more difficult, since a considerable amount of sequencing has been performed in a large part of the Norwegian dataset of Punjabis. The distribution of the DQB1*02 allele is 26.3% for immigrants to Norway, compared to 22% in those in Pathan. DRB1*03 and DRB1*07 are frequent both among Caucasians and the Pakistani immigrants studied in this paper (Klein and Sato 2000, Marsh 2000). All of the ethnic groups presented by Mohyuddin and co-workers included only a few individuals from each region varying from 53 to 100. In addition, all of the ethnic groups represent certain small regions of the 105 districts found in the 4 different Pakistani provinces, and those who came to Norway show the most similarity for HLA class II alleles with the neighbouring region Pathan, which is found north-west of the Punjab province. However, it should be noted that the groups studied by Mohyuddin and co-workers were much smaller than those in our study (Mohyuddin et al. 2002). The present study also covered in particular one region of Pakistan with little migration due to separation by high mountains. However, all six groups in this paper did represent certain small regions of the 105 districts found in the 4 different Pakistani provinces.

The most recent study of Moatter and co-workers involved 1000 unrelated Pakistani individuals from Karachi, which is the second largest and the main financial and commercial city of Pakistan. Karachi is located in the Sind province and has a very similar climate next to the neighbouring Punjab province (Moatter et al. 2010). Although low resolution genotyping

was used, and DQA1 alleles were not studied, it is striking to see the similarity in the distribution of DRB1 and DQB1 allelic groups in our paper. Among the 1000 unrelated Pakistani, DRB1*03,*07,*11 and *15 were found in more than 60% of the samples, which is similar to the present study, which evaluated only 179 unrelated individuals. Comparisons of the main groups of DQB1 alleles also revealed very similar distributions in the study by Moatter et al. and our study; DQB1*02 was found in 26.5% of cases compared to 26.6% in our study, DQB1*03 in 27.5% compared to 26.5% in our study, DQB1*04 in 0.3% compared to 1.7% in our study, DQB1*05 in 20.4% compared to 19.2% in our study and DQB1*06 in 24.5% compared to 26.0% in our study. The selected 179 unrelated Norwegian Pakistani immigrants therefore seem to represent the frequency of the main allele groups found in Pakistan. The available data render it possible to compare the main DRB1 and DQB1 groups of allelles found among Pakistani immigrants in Norway with the different groups in other parts of Pakistan. Based on these data it appears that alleles found among those living in Norway are of Indo-European or mixed ethnic origin (Ansari 1996, Dhaliwal et al. 2007, Meyer et al. 2007, Mughal 1991, Yuliwulandari et al. 2009).

In studies of other ethnic groups, some of the alleles that are rare among Caucasians seem to be frequent in both Pakistani and Indonesian people, such as the DRB1*15:02.01 allele. In our study the DRB1*15:01:01 may have had a higher frequency than the DRB1*15:02:01, however we could not distinguish between DRB1*15:01:01 and DRB1*15:02:01 in 13 samples. As a result, the frequency of the two alleles could also be the same. The predominance of the DRB1*15:02 allele over the DRB1*15:01 allele has been observed in other South-East Asian populations such as Thai, Malay and Vietnamese (Dhaliwal et al. 2007, Gao et al.1992, Hoa et al. 2008), where as North-East Asian populations have shown the opposite (Itoh et al. 2005, Park et al. 1999).

We have presented HLA class II data of Pakistani women representing the first-generation immigrants. Characteristic significant differences were observed in age, level of education, and the duration of residence in Norway between men and women. In our cohort, close to 70% of marriages were consanguineous and 46% of these were between first cousins. This is clearly seen among their newborns, where 21% shared the same genotype (for siblings the maximum expected is 25%). Consanguineous marriages are extremely common in Pakistan, approximately 60% of marriages are reportedly consanguineous and 80% of these are between first cousins (Hussain 1999). It was therefore not surprising that the random

exclusion of either the mother or the father from our data analysis for first-degree-cousins had no effect on allele and haplotype frequencies. Both the total population of 374 and the selected data set of 179 mothers and fathers showed significant deviation from the Hardy Weinberg equilibrium. In conclusion, our study provides the first comprehensive data on HLA class II alleles in Norwegian Pakistani immigrants and provides a valuable reference for organ transplantation.

5.2 Methodological considerations

An important question to consider is whether the results in this thesis represent the general maternal health of Pakistani immigrants in Norway?

5.2.1 Study validity

Selection bias, information bias and confounding are possible sources of systematic errors that may influence the validity or the accuracy of our results.

Selection bias

Selection bias is present when the study population is not representative of the population under consideration. Selection and sampling were performed in our study only once per week. The participants were randomly included 1day per week over a 2 year period. Thus, we consider the chance of systematic selection in the sample to be small. On the other hand the included women were all first-generation immigrants. In recent years the population of Norwegians born to immigrant parents has been increasing, and our results may not be relevant for Norwegian born to those immigrant parents. Second-generation men are still tending to marry women of first-generation, and we therefore consider our results to be relevant for the population of immigrant women marrying Norwegian men born to immigrant parents.

Information bias

Information bias in explanatory variables could also influence the accuracy of the results.

The interviews were performed in Norwegian rather than in 'Urdu', the original Pakistani language. Even after many years in Norway, many Pakistani immigrant women still do not speak Norwegian. Almost half of the participants after delivery (91 women of total 197 women) did speak Norwegian. For the remaindering, professionals and family members were used as interpreters. The presence of family members during the interview might have

led to underreporting of depressive symptoms (Cox et al. 1987). In 71% of the cases, the husbands were present at the interview. However, we analysed the results of those 'to be alone' and those 'who had their husbands with them' and found no significant difference in the prevalence of depressive symptoms.

Confounding factors

A confounding factor is the effect of a third variable that is not explored further. Due to the limited sample, the results presented in the current study are mainly of a descriptive nature. However, we cannot state unequivocally that socioeconomic factors such as income and education and other factors that were not further explored played an important role in the outcomes present in this current thesis.

5.2.2 Study reliability

Reliability is the consistency of a set of measurements or of a measuring instrument, often used to describe a test. For example, would the results of the blood- and buccal-sample testing be any different if we repeated them in another laboratory? The reliability of our laboratory data therefore needs to be at an appropriate level.

All of the antibody testing was performed at Oslo University Hospital and Rikshospitalet using well established routine laboratory tests. We also studied rare outcomes such as hepatitis B. Repeating the studies with a larger sample would increase the reliability of the results.

DNA was isolated from both a blood sample and a buccal sample from several of the individuals included in the HLA typing, as a result several of the participants providing both types of sample. All samples that were HLA typed at Oslo University Hospital, Ullevål were labelled only with a laboratory number, and so there was no chance that the sample to could be connected to the individuals from whom they were taken. DNA from several individuals was therefore HLA genotyped twice (e.g.no 26), and this yielded identical results in all cases. In addition, several samples were purposefully genotyped two or three times based on the two-steps strategy for HLA typing chosen or problems with low DNA concentration (n=114). All retyping and additional testing performed in samples from different subjects also yielded identical results.

5.3 Ethical considerations

Ethnic minorities are vulnerable groups. Thus, it is of great importance to present research results in a manner that does not promote stigma towards them. The study was performed to do good and to increase the knowledge about vulnerable groups in society. Through the current thesis I searched for more knowledge about immigrants from low-income countries in Asia. I hope that the work presented in this thesis will contribute to better health care for immigrant populations. A healthy population is an important factor in development of a good society. I tried to be objective, by gaining knowledge based on solid evidence.

The study was approved by the Regional Committee for Ethics and Research and the Data Inspectorate.

5.4 Further research

Table 2 lists the most important infections in pregnancy that can affect the foetus or the newborn. We have studied CMV, rubella, VZV, HSV-2, *T. gondi* and HBV. HIV and T*reponema pallidum* are in the routine antenatal check-up programme in Norway. Thus, it would be interesting to study parvovirus B 19, HPV, hepatitis C and group B streptococcus.

The role of the immigrant father should be investigated further. Prenatal and post-partum depression was evident in about 10% of men in the reviewed studies and was relatively higher during the 3- to 6- month post-partum period. There is also moderately positive correlation between paternal depression and maternal depression (Paulson and Bazemore 2010). This is an interesting theme, and future studies should focus upon post-partum depression in males and their risk factors.

A comparison of the EPDS and the nine-item Patient Health Questionnaire (PHQ-9) as screening tools for post-partum depression would be of great interest in Norway. The PHQ-9 is a self-administered version of the Primary Care Evaluation of Mental Disorders diagnostic instrument for common mental disorders. The PHQ-9 is the depression module, which scores each of the nine 9 Diagnostic and Statistical Manual of Mental Disorders criteria as from “0” (not at all) to “3” (nearly every day) (Kroenke et al. 2001). Post-partum depression screening is feasible in primary-care practices, and for most women the EPDS and PHQ-9 scores have been concordant (Yawn et al. 2009). Norwegians born to immigrant parents of Pakistani origin live between two cultures. Arranged marriages with partners who grew up in Pakistan are common. More knowledge about perinatal outcomes seems warrented in particular about post-partum depression among Norwegians born to immigrant parents.

6. CONCLUSIONS AND RECOMMENDATIONS

The following conclusions can be drawn and recommendations made from the results obtained in the study described in this thesis:

- Despite a post-partum vaccination programme against rubella being applied in Norwegian maternity wards, 8% of the immigrant Pakistani women in our cohort were seronegative for rubella IgG. Additional efforts are therefore necessary towards the routine rubella testing of immigrants, with vaccination of the seronegatives.
- We found that 7% of the women were seronegative for VZV. We should consider testing the varicella immunity of women of fertile age born in tropical and subtropical regions, and offer the VZV vaccine to seronegatives before pregnancy. Such an approach could reduce VZV-related neonatal and maternal morbidity and mortality rates.
- Seronegative immigrant women from a home country with a high prevalence of toxoplasma should be advised to be tested in pregnancy, and if negative, they should postpone any visits to their home country until after the child is born in order to prevent the risk of being infected with toxoplasma. If they travel during their pregnancy, they should be advised to be tested 3 weeks after the infectious exposure.
- The relevant health authorities should consider giving the HBV vaccine to all newborns in the immigrant population, regardless of their maternal HbsAg status. Pakistani immigrants should be offered the hepatitis B vaccine.
- STIs were not prevalent among our cohort of Pakistani immigrant couples in Norway. It was striking that most couples were discordant.
- The 7.6% prevalence of post-partum depression seems to be lower than the prevalence reported in immigrant populations in other countries; it was also slightly lower than the prevalence among ethnic Norwegians (8.9%). Being a Pakistani immigrant in Norway does not seem to result in a higher risk of post-partum depression. The different risk factors are similar to those reported for other countries. Moreover, there seem to be cultural differences in risk factors between the ethnic Norwegians and Pakistani immigrants.

- This study provides the first comprehensive data on HLA class II alleles in Norwegian Pakistani immigrants, and provides a valuable reference for organ transplantation. In this regard, it should be noted that as many as 20% of second cousins in our study shared an HLA class II genotype.

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ERRATUM

Paper III

In page 894, line 24: we found five different significant risk factors for postpartum depression in the Pakistani immigrants (Table I and II), not four.

The most important was a high score on the life event (OR 84.5), the second was a history of prior depression (OR 29.7), thereafter being single (OR 22.5), poor attachment to partner (OR 8.6), followed by an age over 30 years (OR 4.6).

ERRATA

In page 21, line 19: *gondii* (instead of *gondi*)

In page 34, line 14: socioeconomic (instead of sociaeconomic)

In page 35, line 2: well (instead of welll)

In page 45, paper 4, *Scand J Immunology 2012:75:426-430* (instead of *in press*)

In page 50, line 7: variation (instead of varation)

Line 13: al (instead of ak)

In page 59, line 12: *gondii* (instead of *gondi*)

APPENDIX

1. The Mother and Child Cohort Study questionnaire 1.
2. The post partum depression questionnaire.

Den norske MorogBarn undersøkelsen

Spørreskjema 1

Skjemaet skal leses av en maskin. ***Det er derfor viktig at du legger vekt på følgende ved utfyllingen:***

- Bruk blå eller sort kulepenn.
- I de små avkrysningsboksene setter du *et kryss* for det svaret som du mener passer best, slik: ☒
- Hvis du mener at du har satt kryss i feil boks, kan du rette det ved å fylle boksen helt, slik ■
- I de store, grønne boksene skriver du *tall* eller *store blokkbokstaver*.

  Det er viktig at du bare skriver i det hvite feltet i boksene, slik:

  Tall: 0 1 2 3 4 5 6 7 8 9 Bokstaver: A B C
- Flere steder i skjemaet ber vi om at du angir svaret i forhold til antall svangerskapsuker. *Eksempel: Hvis du skal angi noe som skjedde 5 uker etter siste menstruasjon, krysser du av for uke 5.*
- Spesielle opplysninger som *f.eks. medikamenter* og *yrke* skriver du fritt inne i boksene eller på de åpne linjene.

  Vennligst skriv tydelig med STORE BOKSTAVER.

Så snart du har fylt ut dette skjemaet, ber vi om at du sender det tilbake til oss i den vedlagte, frankerte svarkonvolutten.

Oppgi datoen for utfylling av skjemaet ☐☐ dag ☐☐ måned ☐☐☐☐ år *(skriv årstall med 4 tall f.eks. 1999)*

Menstruasjon

1. Oppgi datoen for første blødningsdag i din siste menstruasjon.

☐☐ dag ☐☐ måned ☐☐☐☐ år

2. Kom din siste menstruasjon til ventet tid?

☐ Nei
☐ Ja

3. Er du sikker på datoen for første blødningsdag i din siste menstruasjon?

☐ Sikker
☐ Usikker

4. Hvordan var varighet, blødningsmengde og smerter i din siste menstruasjon?

	Som vanlig	Mer enn vanlig	Mindre enn vanlig
Varighet	☐	☐	☐
Blødningsmengde	☐	☐	☐
Smerter	☐	☐	☐

5. Hadde du regelmessige menstruasjoner det siste året før du ble gravid?

☐ Nei
☐ Ja

6. Hvor mange dager går det vanligvis fra første dag i en menstruasjon til første dag i den neste?

☐☐ dager

7. Har du i løpet av det siste året før du ble gravid mistet menstruasjonen i mer enn tre måneder, uten å være gravid?

☐ Nei
☐ Ja

8. Pleier du å være nedtrykt (deprimert) eller irritabel før menstruasjonen?

☐ Nei
☐ Ja, men ubetydelig
☐ Ja, merkbart
☐ Ja, plagsomt mye

9. Hvis ja, forsvinner denne følelsen etter at menstruasjonen er kommet i gang?

☐ Nei
☐ Ja

10. Hvor gammel var du da du fikk din første menstruasjon?

☐☐ år

Prevensjon

11. Har du/dere noen gang det siste året brukt følgende metoder for å unngå graviditet? *(Du kan sette flere kryss.)*

- ☐ Kondom
- ☐ Pessar
- ☐ Kobberspiral
- ☐ Hormonspiral
- ☐ Hormonsprøyte
- ☐ Mini-piller
- ☐ P-piller
- ☐ Skum, stikkpille, krem
- ☐ Sikre perioder
- ☐ Avbrutt samleie
- ☐ Ingen slike metoder
- ☐ Annet_____

12. Var dette svangerskapet planlagt?

- ☐ Nei
- ☐ Ja

13. Hvis ja, hvor mange måneder hadde dere regelmessig samleie uten prevensjon før du ble gravid?

- ☐ mindre enn 2 måneder
- ☐ 2-3 måneder
- ☐ 3 måneder eller mer

☐☐ måneder hvis mer enn 3 måneder

14. Ble du gravid selv om du eller din partner brukte prevensjon?

- ☐ Nei
- ☐ Ja

15. Hvis ja, hvilken type? *(Du kan sette flere kryss.)*

- ☐ Kondom
- ☐ Pessar
- ☐ Kobberspiral
- ☐ Hormonspiral
- ☐ Hormonsprøyte
- ☐ Mini-piller
- ☐ P-piller
- ☐ Skum, stikkpille, krem
- ☐ Sikre perioder
- ☐ Avbrutt samleie
- ☐ Annet_____

16. Hvis du hadde spiral da du ble gravid, er den fjernet nå?

- ☐ Nei
- ☐ Ja

17. Hvis du har brukt p-piller/mini-piller, hvor lenge har du brukt dem?

	P-piller	Mini-piller
Mindre enn 1 år	☐	☐
1-3 år	☐	☐
4-6 år	☐	☐
7-9 år	☐	☐
10 år eller mer	☐	☐

18. Hvis du har brukt p-piller/mini-piller, hvor gammel var du da du første gang brukte disse?

☐☐ år

19. Brukte du p-piller/mini-piller de siste 4 månedene før du ble gravid denne gangen?

- ☐ Nei
- ☐ Ja

20. Hvis ja, hvor lang tid før siste menstruasjon sluttet du med p-piller/mini-piller?

☐☐ uker

21. Hvor lenge har du og barnets far hatt et seksuelt forhold?

☐☐ måneder eller ☐☐ år

22. Hvor ofte har du hatt samleie i løpet av de siste fire ukene før du ble gravid og i de siste fire ukene nå?

	Før	Nå
Daglig	☐	☐
5–6 ganger i uken	☐	☐
3–4 ganger i uken	☐	☐
1–2 ganger i uken	☐	☐
1–2 ganger hver 14. dag	☐	☐
Sjeldnere	☐	☐
Ingen ganger	☐	☐

Andre opplysninger

23. Hva var blodtrykket ditt ved første svangerskapskontroll? *(Se i helsekortet ditt.)*

☐☐☐ / ☐☐☐ *Eks.* 150 / 95

24. Hvor mye veide du da du ble gravid, og hvor mye veier du nå?

Da jeg ble gravid: ☐☐☐ kg Nå: ☐☐☐ kg

25. Hvor høy er du?

☐☐☐ cm

26. Hvor høy (ca.) er barnets far?

☐☐☐ cm

27. Hvor mye (ca.) veier barnets far?

☐☐☐ kg

28. Når ble dine foreldre født?

Mor: 19☐☐ Far: 19☐☐ Vet ikke ☐

29. Lever dine foreldre?

	Ja	Nei	Evt. dødsår	Evt. dødsårsak
Mor	☐	☐	☐☐☐☐	_____
Far	☐	☐	☐☐☐☐	_____

30. Når ble foreldrene til barnets far født?

Mor: 19☐☐ Far: 19☐☐ Vet ikke ☐

31. Lever hans foreldre?

	Ja	Nei	Evt. dødsår	Evt. dødsårsak
Mor	☐	☐	☐☐☐☐	_____
Far	☐	☐	☐☐☐☐	_____

Tidligere svangerskap

32. Kryss av for alle tidligere svangerskap. Ta også med svangerskap som endte med abort eller dødfødsel, eller der svangerskapet var utenfor livmoren. Oppgi årstall for svangerskapsstart, hvor mange kilo du la på deg i løpet av svangerskapet og antall måneder du ammet hvert barn. Kryss også av om du røykte i tidligere svangerskap.

Svanger-skaps-nummer	Årstall for svanger skaps-start	Levende født barn	Spontan-aborter/ dødfødsler	Frem-kalt abort	Svanger-skap utenfor livmoren	Svangerskaps-uke for aborten/ dødfødselen	Antall måneder med amming	Vektøkning i svanger-skapet (antall kg)	Røykte i svanger-skapet
1		☐	☐	☐	☐				☐
2		☐	☐	☐	☐				☐
3		☐	☐	☐	☐				☐
4		☐	☐	☐	☐				☐
5		☐	☐	☐	☐				☐
6		☐	☐	☐	☐				☐
7		☐	☐	☐	☐				☐
8		☐	☐	☐	☐				☐
9		☐	☐	☐	☐				☐
10		☐	☐	☐	☐				☐

33. Kryss av hvis du har hatt noen av følgende plager i tidligere svangerskap. *(Du kan sette flere kryss.)*

	Nei	Ja
Bekkenløsning som førte til sykemelding	☐	☐
Bekkenløsning som gjorde det nødvendig med sengeleie	☐	☐
Mye plaget av kvalme og oppkast	☐	☐
Svangerskapsforgiftning	☐	☐
Svangerskapsdiabetes	☐	☐
Sukker i urinen	☐	☐
Mye plaget av ufrivillig urinlekkasje	☐	☐

34. Hvis du hadde bekkenløsning i tidligere svangerskap som gjorde det nødvendig med sengeleie eller sykemelding, når begynte plagene?

måneder etter påbegynt svangerskap

35. Når sluttet plagene?

måneder etter fødselen

☐ har hatt vedvarende plager

36. Har du vært behandlet for ufrivillig barnløshet?

☐ Nei
☐ Ja

37. Hvis ja, var det i forbindelse med dette svangerskapet eller tidligere svangerskap og hva slags behandling var det? *(Du kan sette flere kryss.)*

	Tidligere svanger-skap	Dette svanger-skap
Operasjon på eggledere	☐	☐
Annen form for operasjon	☐	☐
Medisiner mot endometriose	☐	☐
Hormonbehandling	☐	☐
Inseminasjon (innsprøyting av sæd)	☐	☐
Prøverørsmetoden	☐	☐
Annet	☐	☐

38. Hvis du er over 38 år ved beregnet termin, har du fått informasjon om muligheten for å få utført fostervannsprøve?

☐ Nei
☐ Ja

39. Hvis ja, har du planlagt å få utført fostervannsprøve?

☐ Nei
☐ Ja

Tidligere og nåværende sykdommer

40. Kryss av hvis du har eller har hatt noen av følgende sykdommer/plager. Hvis du har brukt tabletter, miksturer, stikkpiller, inhalasjoner, salver osv. i forbindelse med sykdommen/plagen, oppgi navnet på medisinen(e) og når du brukte disse.

Sykdommer/plager			Bruk av medisiner					
Sykdom/plage	Før svanger-skapet	I svanger-skapet	Navn på medisiner	Siste 6 mnd. før svanger-skapet	Svangerskapsuke 0-4	5-8	9-12	13+	Antall dager brukt
Astma/Allergi/Hud									
Astma	☐	☐		☐	☐	☐	☐	☐	
Tetthet/piping i brystet	☐	☐		☐	☐	☐	☐	☐	
Høysnue, pollenallergi	☐	☐		☐	☐	☐	☐	☐	
Dyrehårsallergi	☐	☐		☐	☐	☐	☐	☐	
Atopisk eksem *(ofte kalt barneeksem)*	☐	☐		☐	☐	☐	☐	☐	
Kontakteksem	☐	☐		☐	☐	☐	☐	☐	
Nikkelallergi	☐	☐		☐	☐	☐	☐	☐	
Matallergi	☐	☐		☐	☐	☐	☐	☐	
Annen allergi	☐	☐		☐	☐	☐	☐	☐	
Elveblest *(urticaria)*	☐	☐		☐	☐	☐	☐	☐	
Annen eksem	☐	☐		☐	☐	☐	☐	☐	
Psoriasis	☐	☐		☐	☐	☐	☐	☐	
Munnsår *(herpes)*	☐	☐		☐	☐	☐	☐	☐	
Akne/kviser *(alvorlig)*	☐	☐		☐	☐	☐	☐	☐	
Diabetes/Sukkersyke									
Diabetes behandlet med insulin	☐	☐		☐	☐	☐	☐	☐	
Diabetes ikke behandlet med insulin	☐	☐		☐	☐	☐	☐	☐	
Hjerte/Blod/Stoffskifte/Blodkar									
Medfødt hjertefeil	☐	☐		☐	☐	☐	☐	☐	
Annen hjerte-/karsykdom	☐	☐		☐	☐	☐	☐	☐	
Forhøyet kolesterol	☐	☐		☐	☐	☐	☐	☐	
For høyt blodtrykk	☐	☐		☐	☐	☐	☐	☐	
For høyt stoffskifte	☐	☐		☐	☐	☐	☐	☐	
For lavt stoffskifte	☐	☐		☐	☐	☐	☐	☐	
Anemi/lav blodprosent	☐	☐		☐	☐	☐	☐	☐	
B-12-/folat/folsyremangel	☐	☐		☐	☐	☐	☐	☐	
Lever/Galle									
Hepatitt/leverbetennelse	☐	☐		☐	☐	☐	☐	☐	
Gallestein	☐	☐		☐	☐	☐	☐	☐	

Sykdommer/plager			Bruk av medisiner					
Sykdom/plage	Før svanger-skapet	I svanger-skapet	Navn på medisiner	Siste 6 mnd. før svanger-skapet	Svangerskapsuke 0-4	5-8	9-12	13+	Antall dager brukt
Mage/Tarm									
Sår i magesekk/-tolvfingertarm	☐	☐		☐	☐	☐	☐	☐	
Tykktarmskatarr	☐	☐		☐	☐	☐	☐	☐	
Crohns sykdom	☐	☐		☐	☐	☐	☐	☐	
Ulcerøs colitt	☐	☐		☐	☐	☐	☐	☐	
Cøliaki	☐	☐		☐	☐	☐	☐	☐	
Muskel/Skjelett/Bindevev									
Leddgikt *(revmatoid artritt)*, Bekhterevs sykdom	☐	☐		☐	☐	☐	☐	☐	
Lupus *(SLE)*	☐	☐		☐	☐	☐	☐	☐	
Isjias	☐	☐		☐	☐	☐	☐	☐	
Vondt i ryggen/lumbago	☐	☐		☐	☐	☐	☐	☐	
Fibromyalgi	☐	☐		☐	☐	☐	☐	☐	
Nakke-/skuldersmerter	☐	☐		☐	☐	☐	☐	☐	
Sjøgrens syndrom	☐	☐		☐	☐	☐	☐	☐	
Underlivet/Urinveier									
Betennelse i eggstokker/ledere	☐	☐		☐	☐	☐	☐	☐	
Endometriose	☐	☐		☐	☐	☐	☐	☐	
Nedfall av livmor	☐	☐		☐	☐	☐	☐	☐	
Cyste på eggstokk	☐	☐		☐	☐	☐	☐	☐	
Muskelknuter på livmor	☐	☐		☐	☐	☐	☐	☐	
Celleforandringer på livmorhals	☐	☐		☐	☐	☐	☐	☐	
Herpes	☐	☐		☐	☐	☐	☐	☐	
Kjønnsvorter/kondylomer	☐	☐		☐	☐	☐	☐	☐	
Gonoré	☐	☐		☐	☐	☐	☐	☐	
Chlamydia	☐	☐		☐	☐	☐	☐	☐	
Nyrestein	☐	☐		☐	☐	☐	☐	☐	
Nyrebekkenbetennelse	☐	☐		☐	☐	☐	☐	☐	
Urinveisinfeksjon *(blærekatarr)*	☐	☐		☐	☐	☐	☐	☐	
Urinlekkasje	☐	☐		☐	☐	☐	☐	☐	
Andre lidelser									
Søvnforstyrrelser	☐	☐		☐	☐	☐	☐	☐	
Ekstrem tretthet/tretthetssyndrom	☐	☐		☐	☐	☐	☐	☐	

Sykdommer/plager			Bruk av medisiner						
Sykdom/plage	Før svanger-skapet	I svanger-skapet	Navn på medisiner	Siste 6 mnd. før svanger-skapet	Svangerskapsuke 0-4	5-8	9-12	13+	Antall dager brukt
Migrene	☐	☐		☐	☐	☐	☐	☐	
Annen hodepine	☐	☐		☐	☐	☐	☐	☐	
Epilepsi	☐	☐		☐	☐	☐	☐	☐	
Multippel sklerose	☐	☐		☐	☐	☐	☐	☐	
Cerebral parese	☐	☐		☐	☐	☐	☐	☐	
Depresjon	☐	☐		☐	☐	☐	☐	☐	
Angst	☐	☐		☐	☐	☐	☐	☐	
Anorexi/bulemi	☐	☐		☐	☐	☐	☐	☐	
Annen psykisk lidelse	☐	☐		☐	☐	☐	☐	☐	
Hvilken:									
Annen langvarig og/eller alvorlig sykdom	☐	☐		☐	☐	☐	☐	☐	
Hvilken:									

41. Har du noen gang fått stilt en kreftdiagnose?
- ☐ Nei *(gå til spørsmål 44)*
- ☐ Ja

42. Hvis ja, hvilken diagnose og når ble den stilt?

Diagnose: _____

Årstall da diagnosen ble stilt.

43. Hva slags kreftbehandling har du fått og når?

	Årstall
☐ Operasjon	
☐ Cellegiftbehandling	
☐ Strålebehandling	
☐ Blodoverføring	
☐ Laserbehandling	
☐ Varmebehandling	
☐ Hyperbar oksygenering	
☐ Annet	

44. Har du hatt celleforandringer på livmorhalsen?
- ☐ Nei *(gå til spørsmål 46)*
- ☐ Ja

45. Hvis ja, hvilket år ble dette påvist første gang, og hvilken behandling har du fått?

Årstall da det ble påvist.

- ☐ Laserbehandling
- ☐ Kirurgisk
- ☐ Ingen behandling

46. Hvis du hadde diabetes/sukkersyke før du ble gravid, hva var måleresultatet for ditt langtids blodsukker (HbA1c) ved siste måling før dette svangerskapet?
- ☐ Mindre enn 7,5
- ☐ 7,5 - 12
- ☐ Mer enn 12
- ☐ Vet ikke

47. Blør du for tiden fra tannkjøttet når du pusser tennene?
- ☐ Nei, sjelden eller aldri
- ☐ Ja, av og til
- ☐ Ja, ofte
- ☐ Ja, nesten alltid

48. Har du en medfødt misdannelse/fosterskade?
- ☐ Nei
- ☐ Ja

49. Hvis ja, hvilken? _____

50. Dersom du har hatt en eller flere blødninger fra skjeden i dette svangerskapet, beskriv den første og den siste blødningen. Angi dato for blødningens første dag, hvor mange dager den varte og hvor mye du blødde?

	Dato da blødningen startet	Blødningen varte i antall dager	Kryss av for blødningsmengde *(sporblødning betyr noen dråper)*
Første blødning	dag måned år		☐ Sporblødning ☐ Mer enn sporblødning ☐ Klumper
Siste blødning	dag måned år		☐ Sporblødning ☐ Mer enn sporblødning ☐ Klumper

Hvis mer enn to blødningsepisoder angi antall

51. Har du opplevd noen av de følgende plagene i dette svangerskapet? Hvis du har brukt medisiner i forbindelse med disse plagene, oppgi navn på medisin, i hvilke svangerskapsuker du brukte medisiner og antall dager du brukte dem. *(Dette gjelder alle typer medikamenter, både faste og ikke-faste og naturmedisiner. Ikke før inn vitaminer og kost-tilskudd - disse spør vi om senere i skjemaet.)*

	Hvis du var plaget				Hvis du brukte medisiner					
	Hvilke svangerskapsuker					Hvilke svangerskapsuker				
Plage	0-4	5-8	9-12	13+	Navn på medisiner du brukte	0-4	5-8	9-12	13+	Antall dager brukt
Bekkenløsning	☐	☐	☐	☐		☐	☐	☐	☐	
Kvalme	☐	☐	☐	☐		☐	☐	☐	☐	
Kvalme med brekninger/oppkast	☐	☐	☐	☐		☐	☐	☐	☐	
Soppinfeksjon i skjeden	☐	☐	☐	☐		☐	☐	☐	☐	
Skjedekatarr/uvanlig utflod	☐	☐	☐	☐		☐	☐	☐	☐	
Svangerskapskløe	☐	☐	☐	☐		☐	☐	☐	☐	
Treg mage/forstoppelse	☐	☐	☐	☐		☐	☐	☐	☐	
Diaré	☐	☐	☐	☐		☐	☐	☐	☐	
Diaré med brekninger/oppkast	☐	☐	☐	☐		☐	☐	☐	☐	
Uvanlig tretthet/søvnighet	☐	☐	☐	☐		☐	☐	☐	☐	
Halsbrann/sure oppstøt	☐	☐	☐	☐		☐	☐	☐	☐	
Hevelse i kroppen *(ødem)*	☐	☐	☐	☐		☐	☐	☐	☐	
Feber med utslett	☐	☐	☐	☐		☐	☐	☐	☐	
Feber over 38,5°C	☐	☐	☐	☐		☐	☐	☐	☐	
Forkjølelse	☐	☐	☐	☐		☐	☐	☐	☐	
Halsbetennelse	☐	☐	☐	☐		☐	☐	☐	☐	
Bihule-/ørebetennelse	☐	☐	☐	☐		☐	☐	☐	☐	
Influensa	☐	☐	☐	☐		☐	☐	☐	☐	
Leddsmerter/muskelsmerter	☐	☐	☐	☐		☐	☐	☐	☐	
Lungebetennelse/bronkitt	☐	☐	☐	☐		☐	☐	☐	☐	
Sukker i urin	☐	☐	☐	☐		☐	☐	☐	☐	
Eggehvite *(protein)* i urin	☐	☐	☐	☐		☐	☐	☐	☐	

52. Har du brukt andre medisiner som du ikke har nevnt tidligere? Hvis ja, oppgi navn og når du har tatt disse i tabellen nedenfor.

Navn på medisiner *(f.eks. Valium, Rohypnol, Paracet)*	Bruk av medisiner: Siste 6 mndr. før svangerskapet	I svangerskapsuker 0-4	5-8	9-12	13+	Antall dager brukt
	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	
	☐	☐	☐	☐	☐	

53. Har du de siste 3 månedene hatt vondt i:

	Aldri	Sjelden	Hver uke	Flere dager pr. uke
Magen	☐	☐	☐	☐
Armer/bein	☐	☐	☐	☐
Nakke/skuldre	☐	☐	☐	☐
Hodet	☐	☐	☐	☐
Ryggen	☐	☐	☐	☐

54. Hvis du har hatt vondt, har det forandret seg etter at du ble gravid?

☐ Nei, det er uforandret fra tiden før svangerskapet.
☐ Ja, det er blitt verre i svangerskapet.
☐ Ja, det er blitt bedre i svangerskapet.

Vitaminer, mineraler og kost-tilskudd

Hvis du bruker kost-tilskudd kan du finne frem eske/glass og se på innholdslisten.

55. Kryss av i tabellen nedenfor de vitaminer og mineraler som finnes i innholdslisten, og når og hvor ofte du har brukt dem. Oppgi produktnavn i spørsmål 56.

	Når har du brukt tilskudd? Før siste menstruasjon: 9+ uker	8-5 uker	4-0 uker	Etter siste menstruasjon: 0-4 uker	5-8 uker	9-12 uker	13+ uker	Hvor ofte har du brukt dette? Daglig	4-6 ganger pr.uke	1-3 ganger pr.uke
Vitamin B2 (Riboflavin)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vitamin B6 (Pyridoksin)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vitamin B12 (Cyanokobalamin)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Folat /folsyre/ folacin	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vitamin C	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vitamin A	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vitamin D	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Vitamin E	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tran	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Jern	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Selen	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Kalk/kalsium	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fluor	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

56. Oppgi fullstendig produktnavn på alle de vitaminer eller kost-tilskudd du bruker. Ta også med naturmedisiner og slankepulver.
(Skriv tydelig med blokkbokstaver da det skal leses maskinelt.)

Feks V I T A P L E X M E D J E R N

1

2

3

4

5

6

Sivilstand og utdannelse

57. Hvilken sivilstand har du nå?

- ☐ Gift
- ☐ Samboer
- ☐ Enslig
- ☐ Skilt/separert
- ☐ Enke
- ☐ Annet

58. Hvilken utdannelse har du og barnets far? *(Sett kryss for den høyeste utdannelsen dere har fullført og for den utdannelsen dere eventuelt holder på med.)*

	Deg		Barnets far	
	Fullført	Under Utdannelse	Fullført	Under utdannelse
9-årig grunnskole	☐	☐	☐	☐
1-2-årig videregående	☐	☐	☐	☐
Videregående yrkesfaglig	☐	☐	☐	☐
3-årig videregående allmennfaglig, gymnas	☐	☐	☐	☐
Distriktshøyskole, universitet inntil 4 år *(cand. mag., sykepleier, lærer, ingeniør)*	☐	☐	☐	☐
Universitet, høyskole, mer enn 4 år *(hovedfag, embetseksamen)*	☐	☐	☐	☐
Annen utdannelse	☐	☐	☐	☐

Arbeid og fritid

59. Hva var arbeidssituasjonen for deg og barnets far da du ble gravid? *(Du kan sette flere kryss.)*

	Deg	Barnets far
Skoleelev/student	☐	☐
Hjemmeværende	☐	☐
Yrkespraksis/lærling	☐	☐
Militærtjeneste	☐	☐
Arbeidssøkende/permittert	☐	☐
Attføring/ufør	☐	☐
Ansatt i offentlig virksomhet	☐	☐
Ansatt i privat virksomhet	☐	☐
Selvstendig næringsdrivende	☐	☐
Familiemedlem uten fast lønn i familiebedrift *(f.eks. gårdsbruk, forretning)*	☐	☐
Annet	☐	☐

60. Hadde du en ekstrajobb (lønnet eller ulønnet) da du ble gravid? *(f.eks. regnskapsfører, frisør, vokalist i danseband, fritidsleder)*

- ☐ Nei
- ☐ Ja, beskriv: _____

61. Har du vært fraværende fra ditt vanlige arbeid i mer enn to uker av dette svangerskapet?

- ☐ Nei
- ☐ Ja

62. Er du fraværende fra ditt vanlige arbeid nå?

- ☐ Nei
- ☐ Ja

63. Hvis ja, hva er årsaken til fraværet?

- ☐ Sykemelding
- ☐ Permisjon
- ☐ Sykt barn
- ☐ Annet _____

64. Antall timer lønnet arbeid vanligvis pr. uke før du ble gravid og nå? Før: ☐☐ timer Nå: ☐☐ timer

Spørsmål om nåværende arbeidssituasjon besvares av alle som har inntektsgivende arbeid, selv om de midlertidig er fraværende fra dette pga. sykdom, permisjon eller lignende.

	Deg	Barnets far
65. Beskriv virksomheten på nåværende arbeidsplass eller tjenestested så nøyaktig som mulig. *(Skriv f.eks. sykehusavdeling for barn med kreft, karosseriavdeling på verksted for dieselbiler, hjemmearbeidende.)*		
66. Yrke/tittel på dette arbeidsstedet? *(Skriv f.eks. avdelingssykepleier, biloppretter, formann, adjunkt, elev, spesialarbeider, renholdsassistent, hjemmeværende.)*		

67. Kryss av for følgende spørsmål som gjelder nåværende arbeid. *(Kryss av for hvert spørsmål.)*

	Ja, daglig mer enn halve arbeidstiden	Ja, daglig mindre enn halve arbeidstiden	Ja, i perioder, men ikke daglig	Sjelden eller aldri
Hender det at du har så mye å gjøre at arbeidssituasjonen blir oppjaget og masete?	☐	☐	☐	☐
Må du vri eller bøye deg mange ganger i timen?	☐	☐	☐	☐
Arbeider du med hendene løftet i skulderhøyde eller høyere?	☐	☐	☐	☐
Arbeider du stående/gående?	☐	☐	☐	☐
Kan du velge å arbeide litt raskere visse dager og litt roligere andre dager?	☐	☐	☐	☐
Er du utsatt for så mye støy eller lyder at du synes det er ubehagelig?	☐	☐	☐	☐
Er du utsatt for så mye støy eller lyder at du må heve stemmen for å snakke med andre, selv på en meters avstand?	☐	☐	☐	☐

68. Ta stilling til følgende beskrivelser av din arbeidssituasjon. *(Kryss av for hvert utsagn.)*

	Stemmer	Stemmer ganske bra	Stemmer ikke særlig bra	Stemmer ikke i det hele tatt
Jeg har fysisk tungt arbeid.	☐	☐	☐	☐
Jeg har et stressende/masete arbeid.	☐	☐	☐	☐
Jeg lærer mye i arbeidet mitt.	☐	☐	☐	☐
Arbeidet innebærer at jeg gjør de samme tingene om og om igjen.	☐	☐	☐	☐
Arbeidet mitt krever stor arbeidsinnsats.	☐	☐	☐	☐
Jeg har muligheten til selv å bestemme hvordan arbeidet skal utføres.	☐	☐	☐	☐
Det er godt samhold på arbeidsplassen.	☐	☐	☐	☐
Jeg trives i arbeidet mitt.	☐	☐	☐	☐

69. Hvilken arbeidstidsordning har du nå?

- ☐ Fast dagarbeid
- ☐ Fast ettermiddags- eller kveldsarbeid
- ☐ Fast nattarbeid
- ☐ Skiftarbeid eller turnusordning
- ☐ Ingen fast ordning *(ekstrahjelp, ekstravakt, vikar o.l.)*
- ☐ Annen ordning

70. Løfter du nå når du er gravid noe som veier mer enn 10 kg? *(10 kg tilsvarer vekten av en full vannbøtte.)*

	Hjemme	På arbeid
Ja, mer enn 20 ganger daglig	☐	☐
Ja, 10 til 20 ganger daglig	☐	☐
Ja, mer enn 20 ganger ukentlig	☐	☐
Ja, mindre enn 20 ganger ukentlig	☐	☐
Sjelden eller aldri	☐	☐

71. Hvor ofte har du arbeidet ved radiosender eller radar etter at du ble gravid?

- ☐ Aldri
- ☐ Noen ganger i uken
- ☐ Daglig
- ☐ I gjennomsnitt mer enn 1 time daglig

72. Hvor ofte snakker du i mobiltelefon?

- ☐ Aldri
- ☐ Noen ganger i uken
- ☐ Daglig
- ☐ I gjennomsnitt til sammen mer enn 1 time daglig

73. Varer en enkel mobiltelefonsamtale mer enn 15 minutter?

- ☐ Aldri
- ☐ Sjelden
- ☐ Ofte

74. Hvor ofte har du arbeidet ved dataskjerm, laserprinter eller kopieringsmaskin (mindre enn 2 meters avstand) etter at du ble gravid?

- ☐ Aldri
- ☐ Noen ganger i uken
- ☐ Daglig
- ☐ I gjennomsnitt mer enn 1 time daglig

75. Hvor ofte har du arbeidet ved røntgenapparat (mindre enn 2 meters avstand) etter at du ble gravid? *(Ta ikke med behandling som pasient.)*

- ☐ Aldri
- ☐ Noen ganger i uken
- ☐ Daglig
- ☐ I gjennomsnitt mer enn 1 time daglig

76. Hvor ofte har du gått på diskotek etter at du ble gravid?

- ☐ 1-2 ganger i uken
- ☐ Sjeldnere
- ☐ Aldri

77. Har du i ditt arbeid eller din fritid kontakt med dyr?

- ☐ Nei
- ☐ Ja

78. Hvis ja, hva slags dyr og hvor ofte pr. uke er du i kontakt med dyr?

	Daglig	3-6 ganger pr. uke	1-2 ganger pr. uke	Sjeldnere
Hund	☐	☐	☐	☐
Katt	☐	☐	☐	☐
Marsvin	☐	☐	☐	☐
Hamster	☐	☐	☐	☐
Kanin	☐	☐	☐	☐
Undulat o.l.	☐	☐	☐	☐
Akvariefisk	☐	☐	☐	☐
Ku	☐	☐	☐	☐
Gris	☐	☐	☐	☐
Sau, geit	☐	☐	☐	☐
Hest	☐	☐	☐	☐
Fjærkre	☐	☐	☐	☐
Annet	☐	☐	☐	☐

79. Har du vært i kontakt med noe av følgende i fritid eller arbeid i løpet av det siste halve året?

	Nei	Ja	Hvis ja, antall dager siste 1/2 året (daglig = 180 dager)	Kryss av hvis du har brukt avtrekk eller åndedrettsvern	Kryss av om du har brukt hansker
Blydunster, blystøv, blypartikler eller blylegeringer	☐	☐		☐	☐
Krom, arsenikk, kadmium eller sammensetninger av disse	☐	☐		☐	☐
Bensin eller eksos *(gjelder ikke fylling av bensin til egen bil)*	☐	☐		☐	☐
Kvikksølvdamp, kvikksølv eller arbeid med amalgam-fyllinger *(ta ikke med beh. som pasient)*	☐	☐		☐	☐
Desinfeksjonsmidler, midler mot skadedyr	☐	☐		☐	☐
Plantevernmidler *(ugressmidler, insektmidler, soppmidler)*	☐	☐		☐	☐
Oljebasert maling	☐	☐		☐	☐
Vannbasert eller latex maling	☐	☐		☐	☐
Malingtynnere, maling-, lakk- eller limfjerner eller andre løsemidler *(f.eks lynol, white spirit, toluen, karbontetraklorid)*	☐	☐		☐	☐
Fargestoffer eller trykksverte i industri	☐	☐		☐	☐
Motorolje, smøreolje eller andre typer olje	☐	☐		☐	☐
Fotokjemikalier *(fiks eller fremkaller)*	☐	☐		☐	☐
Sveising	☐	☐		☐	☐
Lodding	☐	☐		☐	☐
Formalin/formaldehyd	☐	☐		☐	☐
Kjemoterapeutiske stoffer/cellegiftbehandling *(ta ikke med behandling som pasient)*	☐	☐		☐	☐
Lystgass eller andre narkosegasser *(ta ikke med behandling som pasient)*	☐	☐		☐	☐
Andre stoffer og forhold, beskriv _____	☐	☐		☐	☐

Bolig og husholdning

80. Hvem deler du husholdning med? *(Du kan sette flere kryss.)*

- ☐ Ektefelle/samboer
- ☐ Foreldre
- ☐ Svigerforeldre
- ☐ Barn
- ☐ Ingen
- ☐ Andre, beskriv_____

81. Hvor mange personer er det i husholdningen. *(Tell med deg selv.)*

Antall personer over 18 år .....

Antall personer 12-18 år .....

Antall personer 6-11 år .....

Antall personer under 6 år .....

82. Hvor mange av barna har plass i barnehage?

☐ barn

83. Hvilken folkegruppe (etnisk gruppe) regner du at du selv og barnets far tilhører? *(Du kan sette flere kryss.)*

	Deg	Barnets far
Norsk	☐	☐
Samisk	☐	☐

Hvis annen folkegruppe, hvilken?

Deg selv:_____

Barnets far:_____

84. Hvilken folkegruppe (etnisk gruppe) regner du at dine egne foreldre og foreldrene til barnets far tilhører eller tilhørte?
(Du kan sette flere kryss.)

	Din egen mor	Din egen far	Mor til barnets far	Far til barnets far
Norsk	☐	☐	☐	☐
Samisk	☐	☐	☐	☐

Hvis annen folkegruppe, hvilken?

Din egen mor:_____

Din egen far:_____

Mor til barnets far:_____

Far til barnets far:_____

85. Hva er brutto årsinntekt (før skatt) for deg og barnets far?
(Inkl. barnebidrag, arbeidsledighets-trygd, kontantstøtte, osv.)

Din brutto årsinntekt
- ☐ Ingen inntekt
- ☐ Under 150.000 kr.
- ☐ 151-200.000 kr.
- ☐ 201-300.000 kr.
- ☐ 301-400.000 kr.
- ☐ 401-500.000 kr.
- ☐ over 500.000 kr.

Brutto årsinntekt til barnets far
- ☐ Ingen inntekt
- ☐ Under 150.000 kr.
- ☐ 151-200.000 kr.
- ☐ 201-300.000 kr.
- ☐ 301-400.000 kr.
- ☐ 401-500.000 kr.
- ☐ over 500.000 kr.
- ☐ Vet ikke

86. Kan din husholdning klare seg økonomisk uten at du har inntekt?
- ☐ Nei
- ☐ Ja, men med problemer
- ☐ Ja, uten problemer

87. Hvilken type bolig bor du i?
- ☐ Enebolig
- ☐ Gårdsbruk
- ☐ Tomannsbolig
- ☐ Firemannsbolig
- ☐ Rekkehus
- ☐ Terrasseleilighet
- ☐ Kjellerleilighet/hageleilighet
- ☐ Blokk
- ☐ Bygård/leiegård. Hvilken etasje? ☐☐ etg.
- ☐ Annet_____

88. Er det kjeller i boligen?
- ☐ Nei
- ☐ Ja

89. Hvor stort boareal har boligen din, og når ble den bygget?

☐☐☐ m² byggeår ☐☐☐☐ ☐ Vet ikke

90. Har det vært fuktskader i boligen din i løpet av de siste 3 måneder?
- ☐ Nei
- ☐ Ja

91. Har det vært synlig sopp- eller muggvekst i boligen din i løpet av de siste 3 måneder?
- ☐ Nei
- ☐ Ja

92. Har det vært mugglukt i boligen din i løpet av de siste 3 måneder?
- ☐ Nei
- ☐ Ja

93. Er du nå for tiden utsatt for støy fra gate/vei, og/eller fra tog, fly, bedrifter eller bygge- og anleggsvirksomhet når du oppholder deg inne i boligen eller like utenfor boligen?

	Nei	Ja
Inne i boligen	☐	☐
Like utenfor boligen	☐	☐

94. Hvis ja, kryss av for hvor plagsom du synes denne støyen er:
- ☐ Meget plagsom
- ☐ Noe plagsom
- ☐ Lite plagsom
- ☐ Ikke plagsom

95. Leier du boligen din?
- ☐ Nei
- ☐ Ja

96. Hva slags drikkevann er det der du bor?
- ☐ Vann fra offentlig eller privat vannverk
- ☐ Vann fra egen vannforsyning *(f.eks. egen brønn)*

97. Hvor mange ganger har du flyttet i løpet av de siste 3 årene?

☐☐ ganger

98. Har noen du bor sammen med hatt influensa, langvarig hoste, barnesykdom eller feber med utslett etter at du ble gravid?
- ☐ Nei
- ☐ Ja

99. Hvis ja, kryss av for hvilken sykdom.
- ☐ Røde hunder
- ☐ Vannkopper
- ☐ Meslinger
- ☐ 4. Barnesykdom
- ☐ Influensa
- ☐ Feber med utslett
- ☐ Langvarig hoste
- ☐ Tuberkulose
- ☐ Munn-hånd- og fot sykdom
- ☐ Annet

Levevaner

100. Røykte din mor da hun var gravid med deg?
- ☐ Nei
- ☐ Ja
- ☐ Vet ikke

101. Er du utsatt for passiv røyking hjemme?
- ☐ Nei
- ☐ Ja

102. Hvis ja, hvor mange timer pr. dag?

☐☐ timer pr. dag

103. Er du utsatt for passiv røyking på arbeid?
- ☐ Nei
- ☐ Ja

104. Hvis ja, hvor mange timer pr. dag?

☐☐ timer pr. dag

105. Røykte barnets far før du ble gravid?
- ☐ Nei
- ☐ Ja

106. Røyker han nå?
- ☐ Nei
- ☐ Ja

107. Røyker du eller har du noen gang røykt?
- ☐ Aldri *(gå til spørsmål 117)*
- ☐ Av og til / festrøyking
- ☐ Daglig
- ☐ Sluttet å røyke

108. Hvor gammel var du da du begynte å røyke daglig?

☐☐ år

109. Røykte du de siste 3 månedene før du ble gravid denne gangen?
- ☐ Nei
- ☐ Av og til ☐☐ Sigaretter pr. uke
- ☐ Daglig ☐☐ Sigaretter pr. dag

110. Røyker du nå (etter at du ble gravid)?
- ☐ Nei
- ☐ Av og til ☐☐ Sigaretter pr. uke
- ☐ Daglig ☐☐ Sigaretter pr. dag

111. Dersom du har sluttet å røyke etter at du ble gravid, i hvilken svangerskapsuke sluttet du å røyke?

☐☐ svangerskapsuke

112. Hva slags sigaretter/tobakk brukte du de siste 3 måneder før svangerskapet og i svangerskapet?

	Før svanger-skapet	I svanger-skapet	Navn på sigaretter/tobakk
Ferdige sigaretter			
Vanlig	☐	☐	_____
Light	☐	☐	_____
Med filter	☐	☐	_____
Uten filter	☐	☐	_____
Rulletobakk	☐	☐	_____
Pipetobakk	☐	☐	_____
Cigarillos/sigar	☐	☐	_____
Skrå/tyggetobakk/snus	☐	☐	_____

113. Hvis du har brukt andre former for nikotin, kryss av for hvilken type og når du har brukt den.

	Før svangerskapet	I svangerskapet
Nikotintyggegummi	☐	☐
Nikotinplaster	☐	☐
Nikotininhalator	☐	☐

114. Hvor lang tid går det fra du står opp om morgenen til du røyker din første sigarett?
- ☐ 5 minutter
- ☐ 6–30 minutter
- ☐ 31–60 minutter
- ☐ Mer enn en time

115. Røyker du når du er syk?
- ☐ Nei
- ☐ Ja

116. Røyker du oftere de første timene etter at du har våknet enn du gjør resten av dagen?
- ☐ Nei
- ☐ Ja

117. Oppgi drikkemengde (antall kopper/glass) hver dag både før du ble gravid og nå? (1 krus = 2 kopper, 1 liten plastflaske (0,5l) = 4 kopper, 1 stor plastflaske (1,5l) = 12 kopper)

	Antall kopper/glass: Før svangerskapet	Antall kopper/glass: Nå	Koffeinfritt *(kryss av)*
Filterkaffe	☐☐	☐☐	☐
Pulverkaffe	☐☐	☐☐	☐
Kokekaffe	☐☐	☐☐	☐
Te	☐☐	☐☐	☐
Urtete	☐☐	☐☐	☐
Coca Cola, Pepsi e.l.	☐☐	☐☐	☐
Annen brus	☐☐	☐☐	☐
Coca Cola-/Pepsi-light e.l	☐☐	☐☐	☐
Annen light-brus	☐☐	☐☐	☐
Springvann	☐☐	☐☐	
Flaskevann *(Farris, Olden e.l.)*	☐☐	☐☐	
Saft/juice	☐☐	☐☐	
Saft/juice (light)	☐☐	☐☐	
Skummet melk	☐☐	☐☐	
Lettmelk	☐☐	☐☐	
Helmelk	☐☐	☐☐	
Annet	☐☐	☐☐	

118. Har du noen gang brukt noen av de følgende stoffene?

	Aldri	Tidligere	I siste måned før svangerskapet	I svangerskapet
Hasj	☐	☐	☐	☐
Amfetamin	☐	☐	☐	☐
Ecstasy	☐	☐	☐	☐
Kokain	☐	☐	☐	☐
Heroin	☐	☐	☐	☐

119. Hvor ofte drakk du alkohol før du ble gravid og hvor ofte drikker du i svangerskapet?

	Siste 3 måneder før svangerskapet	I svangerskapet
Aldri *(gå til spørsmål 128)*	☐	☐
Sjeldnere enn 1 gang pr måned	☐	☐
Omtrent 1-3 ganger pr måned	☐	☐
Omtrent 1 gang pr uke	☐	☐
Omtrent 2-3 ganger pr uke	☐	☐
Omtrent 4-5 ganger pr uke	☐	☐
Omtrent 6-7 ganger pr uke	☐	☐

120. Hvilken type alkohol drikker du vanligvis? *(Du kan sette flere kryss.)*

- Lettøl ☐
- Øl ☐
- Rødvin ☐
- Hvitvin ☐
- Rusbrus ☐
- Hetvin *(sherry, portvin, madeira)* ☐
- Brennevin *(vodka, gin, akevitt, cognac, whisky, likør)* ☐

Enheter alkohol

For å sammenligne ulike typer alkohol spør vi etter det vi kaller alkohol-enheter (= 1.5 cl ren alkohol). En alkoholenhet tilsvarer:

1 glass (1/3 liter) øl
1 vinglass rød eller hvitvin
1 hetvinsglass, sherry eller annen hetvin
1 drammeglass brennevin eller likør

121. Hvis du tenker på perioden mens du har vært gravid - også helt tidlig i svangerskapet - har du drukket 5 alkoholenheter eller mer ved minst en anledning?

☐ Nei

☐ Ja ____ ganger
☐ Vet ikke

122. Hvor mange enheter alkohol kan du drikke før du føler deg alkoholpåvirket?

____ enheter

123. Hvor mange enheter drikker du vanligvis når du nyter alkohol? *(Kryss av for tiden før du ble gravid og nå.)*

	Siste 3 måneder før svanger-skapet	I svanger-skapet
Færre enn 1	☐	☐
1-2	☐	☐
3-4	☐	☐
5-6	☐	☐
7-9	☐	☐
10 eller flere	☐	☐

124. Har du opplevd følgende problemer i det siste året i forbindelse med egen bruk av alkohol.

- Kranglet eller fått negative følelser overfor en i familien ☐
- Plutselig befunnet deg på et sted og ikke husket hvordan du kom dit ☐
- Vært borte fra arbeid eller skole ☐
- Besvimt eller sluknet helt plutselig ☐
- Hatt en trist periode ☐

125. Har andre ergret deg ved å kritisere hvor mye du drikker?

☐ Nei
☐ Ja

126. Har du noen ganger følt at du burde drikke mindre?

☐ Nei
☐ Ja

127. Har du noen ganger drukket alkohol om morgenen for å roe nervene eller bli kvitt «dagen-derpå-hodepine»?

☐ Nei
☐ Ja

Fysisk aktivitet

128. Hvor ofte driver du fysisk aktivitet?

	Siste 3 måneder før dette svangerskapet			I dette svangerskapet		
	Aldri	Antall ganger pr uke	Minutter pr gang	Aldri	Antall ganger pr. uke	Minutter pr gang
Rolig gange/spasertur	☐			☐		
Rask gange/turgang	☐			☐		
Løping/jogging/orientering	☐			☐		
Sykling	☐			☐		
Helsestudio/styrketrening	☐			☐		
Spesiell gymnastikk/aerobics for gravide	☐			☐		
Aerobics/gymnastikk/dans uten løp og hopp	☐			☐		
Aeobics/gymnastikk/dans med løp og hopp	☐			☐		
Folkedans/swing	☐			☐		
Rock/diskodans	☐			☐		
Skigåing	☐			☐		
Ballspill/nettballspill	☐			☐		
Svømming	☐			☐		
Riding	☐			☐		
Annet	☐			☐		

129. Hvor mange ganger pr. uke gjør du øvelser for disse muskelgruppene?

	Siste 3 måneder før dette svangerskapet			I dette svangerskapet		
	Aldri	Antall ganger pr. uke	Minutter pr gang	Aldri	Antall ganger pr. uke	Minutter pr gang
Magemuskler	☐			☐		
Ryggmuskler	☐			☐		
Bekkenbunnsmuskler	☐			☐		

+ +

Litt mer om deg selv og hvordan du har det nå

130. Kryss av om du er enig eller uenig i de følgende påstandene.

	Helt uenig	Uenig	Litt uenig	Verken eller	Litt enig	Enig	Helt enig
På de fleste måter er livet mitt nær idealet mitt	☐	☐	☐	☐	☐	☐	☐
Livsbetingelsene mine er svært gode	☐	☐	☐	☐	☐	☐	☐
Jeg er fornøyd med livet mitt	☐	☐	☐	☐	☐	☐	☐
Så langt har jeg oppnådd det som er viktig for meg i livet	☐	☐	☐	☐	☐	☐	☐
Hadde jeg kunnet leve livet på nytt, ville jeg nesten ikke forandret noe	☐	☐	☐	☐	☐	☐	☐

131. Har du noen utenom din ektefelle/samboer/partner som du kan søke råd hos i en vanskelig situasjon?

☐ Nei
☐ Ja

+

132. Hvis ja, hvor mange?

☐☐ personer

133. Hvordan passer denne beskrivelsen: Det er et nært samhold mellom meg og min ektefelle/ samboer/ partner.

☐ Passer helt
☐ Passer brukbart
☐ Passer delvis
☐ Passer heller dårlig
☐ Passer slett ikke

134. Hvor ofte treffer du eller snakker du i telefonen med familie (utenom husholdningen) eller nære venner i løpet av 2 uker?

☐☐ ganger

135. Føler du deg ofte ensom?

☐ Nesten aldri
☐ Sjelden
☐ Av og til
☐ Som regel
☐ Nesten alltid

+

136. Har du i løpet av de to siste ukene vært plaget med noe av det følgende?

	Ikke plaget	Litt plaget	Ganske mye plaget	Veldig mye plaget
Redd eller engstelig	☐	☐	☐	☐
Nervøsitet, indre uro	☐	☐	☐	☐
Følelse av håpløshet med hensyn til fremtiden	☐	☐	☐	☐
Nedtrykt, tungsindig	☐	☐	☐	☐
For mye bekymret eller urolig	☐	☐	☐	☐

137. Har du de siste 12 måneder eller tidligere som voksen opplevd at noen har gitt deg en ørefik, slått eller sparket deg eller plaget deg fysisk på annen måte?

	Siste 12 måneder	Tidligere
Nei	☐	☐
Ja	☐	☐
Husker ikke	☐	☐

138. Har du de siste 12 måneder eller tidligere opplevd at du ble presset eller tvunget til seksuell omgang?
(Du kan sette flere kryss.)

	Siste 12 måneder	Tidligere
Nei, aldri	☐	☐
Ja, presset	☐	☐
Ja, utøvd makt	☐	☐
Ja, voldtatt	☐	☐

139. Hva slags oppfatning har du av deg selv?
(Kryss av for hvert alternativ.)

	Svært enig	Enig	Uenig	Svært uenig
Jeg har en positiv holdning til meg selv.	☐	☐	☐	☐
Jeg føler meg virkelig ubrukelig til tider.	☐	☐	☐	☐
Jeg føler at jeg ikke har mye å være stolt av.	☐	☐	☐	☐
Jeg føler at jeg er en verdifull person på lik linje med andre.	☐	☐	☐	☐

+

140. Har du noen ganger i en sammenhengende periode på 2 uker eller mer:

	Nei	Ja
Følt deg deprimert, trist, nedfor	☐	☐
Hatt problemer med matlysten eller spist for mye	☐	☐
Vært plaget av kraftløshet eller mangel på overskudd	☐	☐
Virkelig bebreidet deg selv og følt deg verdiløs	☐	☐
Hatt problemer med å konsentrere deg eller hatt vanskeligheter for å ta beslutninger	☐	☐
Hatt minst 3 av de problemene som er nevnt ovenfor samtidig	☐	☐

141. Hvis du har hatt 3 eller flere av disse problemene samtidig, hvor mange uker varte den lengste perioden?

☐☐ uker

142. Var det en spesiell grunn til dette?

☐ Nei, ingen spesiell grunn
☐ Ja *(f.eks. dødsfall, skilsmisse, abort, ulykke)*

Vekt og vektkontroll

143. Synes du selv at du var for tykk i tiden like før du ble gravid denne gangen?

☐ Ja, en god del
☐ Ja, litt
☐ Nei

144. Er du engstelig for å legge på deg mer enn nødvendig under nåværende svangerskap?

☐ Ja, veldig engstelig
☐ Nokså engstelig
☐ Nei, ikke særlig engstelig

145. Har det hendt i løpet av de siste to årene at andre bemerket at du var for tynn, mens du selv syntes du var for tykk?

☐ Ja, ofte
☐ Ja, noen få ganger
☐ Nei

146. Har det hendt at du følte at du mistet kontrollen mens du spiste og ikke klarte å stoppe før du hadde spist altfor mye?

	Siste halvår før dette svangerskapet	Nå
Ja, minst en gang i uken	☐	☐
Sjelden/aldri	☐	☐

147. Har du brukt noen av de følgende måtene for å kontrollere vekten?

	Siste halvår før dette svangerskapet		Nå	
	Minst 1 gang i uken	Sjelden/ aldri	Minst 1 gang i uken	Sjelden/ aldri
Oppkast	☐	☐	☐	☐
Avføringsmidler	☐	☐	☐	☐
Fastekurer	☐	☐	☐	☐
Hard fysisk trening	☐	☐	☐	☐

148. Er det viktig for synet du har på deg selv, at du holder en bestemt vekt?

☐ Ja, svært viktig
☐ Ja, nokså viktig
☐ Nei, ikke særlig viktig

Tusen takk for hjelpen!

Legg det utfylte skjemaet i den frankerte returkonvolutten og send det til:

Den norske Mor og Barn undersøkelsen
Medisinsk fødselsregister
Armauer Hansens Hus
5839 Bergen

Studie av kvinners helse etter fødsel

Dato for utfylling_____

Hvor ble barnet født? _____ (hvilket sykehus)

Skal klippes vekk og oppbevares på Statens institutt for folkehelse i låst skap

Ditt fulle navn:_____
(i blokkbokstaver)

Din adresse:_____

_____

Telefon:_____

Din fødselsdato:_____ **Personnummer:**_____
(hvis du er under 18 år kan du ikke delta i undersøkelsen)

Bakgrunn og familiesituasjon

1. Når ble barnet født? _____ *(dato)*

2. Fødte du til forventet tid ?
- ☐ Ja
- ☐ Nei

Hvis nei, _____ *(antall dager **før** tiden)*
_____ *(antall dager **etter** tiden)*

3. Barnets kjønn?
- ☐ Gutt
- ☐ Jente

4. Hvor mye veide barnet ved fødselen?

_____ *(antall gram)*

5. Fødested

I hvilket land ble du født? _____

I hvilket land ble din mor født? _____

I hvilket land ble din far født? _____

I hvilket land ble barnefaren født? _____

6. Hva er din sivilstatus? *(sett ett eller flere kryss)*
- ☐ Gift
- ☐ Samboende
- ☐ Enslig
- ☐ Tidligere gift/samboer
- ☐ Enke
- ☐ Annet

7. Hvem bor du sammen med? *(sett ett eller flere kryss)*
- ☐ Ektefelle/samboer
- ☐ Barn under 3 år _____ *(antall)*
- ☐ Barn mellom 3-12 år _____ *(antall)*
- ☐ Barn over 12 år _____ *(antall)*
- ☐ Andre voksne personer _____ *(antall)*

Utdanning og arbeid

8. Hva slags utdanning har du selv og barnets far? Sett kryss for den høyeste utdanningen dere har fullført.

Utdanning	*Du selv*	*Barnets far*
9-årig skole	☐	☐
Videregående skole med allmennfaglig retning (gymnas)	☐	☐
Videregående skole med yrkesfaglig retning (yrkesskole)	☐	☐
Universitet eller høyskole inntil 4 år	☐	☐
Universitet eller høyskole mer enn 4 år	☐	☐
Annen utdanning	☐	☐

9. Hva slags arbeidsforhold hadde du før fødselen? Hva slags arbeidsforhold har barnets far? *(sett ett eller flere kryss)*

	Du selv	*Barnets far*
Lønnet arbeid/lønnsmottaker	☐	☐
Fulltid	☐	☐
Deltid	☐	☐
Selvstendig næringsdrivende	☐	☐
Under utdanning eller opplæring	☐	☐
Arbeidsledig	☐	☐
Uføretrygdet /attføring	☐	☐
Hjemmearbeidende	☐	☐
Annet, hva	☐	☐

10. Hva slags yrke har du? *(eller hadde du sist du var i arbeid)* _____

11. Hva var husholdningens omtrentlige brutto årsinntekt i fjor? *(regn med trygd/studielån)*
- ☐ Under 150.000 kr
- ☐ 151- 200.000 kr
- ☐ 201- 250.000 kr
- ☐ 251- 300.000 kr
- ☐ 301- 400.000 kr
- ☐ Over 400.000 kr

12. Dersom du fikk en uventet regning på 5.000, hvor lett ville det være å betale den i løpet av en uke?
- ☐ Ingen problemer
- ☐ Litt vanskelig
- ☐ Meget vanskelig

Tidligere svangerskap og menstruasjonsforhold

13. Hvor gammel var du da du fikk menstruasjon første gang? _____ *år*

14. Hadde du regelmessig menstruasjon forut for denne graviditeten? *(omtrent likt antall dager mellom hver menstruasjon)*
- ☐ Nei
- ☐ Ja

15. Forut for denne graviditeten, var du nedtrykt (deprimert) eller irritabel før menstruasjon?
- ☐ Nei
- ☐ Ja, merkbart
- ☐ Ja, men ubetydelig
- ☐ Ja, plagsomt mye

16. Hvis ja, forsvant denne følelsen etter at menstruasjonen var kommet igang?
- ☐ Nei
- ☐ Ja

17. Har du nå fått ditt første barn?
- ☐ Ja
- ☐ Nei, jeg har _____ fra før

18. Har du noen gang opplevd abort eller dødfødsel?
- ☐ Nei
- ☐ Ja, ufrivillig abort _____ *(antall ganger)*
- ☐ Ja, tatt abort (selvbestemt) _____ *(antall ganger)*
- ☐ Ja, dødfødsel (etter 16 ukers svangerskap)____ *(ant. ganger)*

19. Har du noen gang opplevd graviditet utenfor livmoren?
- ☐ Nei
- ☐ Ja, _____ *(antall ganger)*

Det siste svangerskapet

20. Har du under svangerskapet eller etter fødselen vært plaget av:

	I svanger-skapet	*Etter fødselen*
Magesmerter	☐	☐
Ryggsmerter	☐	☐
Smerter i armer, ben/ledd	☐	☐
Smerter eller problemer under samleie	☐	☐
Hodepine	☐	☐
Brystsmerter	☐	☐
Svimmelhet	☐	☐
Besvimelsesanfall	☐	☐
Hjertebank	☐	☐
Pustebesvær	☐	☐
Forstoppelse, løs mage/fordøyelsesbesvær	☐	☐
Følelse av tretthet/manglende energi	☐	☐
Søvnproblemer	☐	☐

☐ Jeg har ikke hatt noen av disse plagene

21. Var du plaget av kvalme under svangerskapet?
☐ Nei ☐ Ja

22. Hvis ja, *når* i svangerskapet? *(sett ett eller flere kryss)*
☐ Første 3 mnd
☐ Midt i svangerskapet
☐ Siste del av svangerskapet

23. Hvis du var plaget av kvalme under svangerskapet, hvordan var dette for deg? *(sett ett eller flere kryss)*
☐ Jeg var litt plaget
☐ Jeg var mye plaget
☐ Jeg var sykemeldt på grunn av kvalme
☐ Jeg ble innlagt på sykehus på grunn av kvalme/vekttap

24. Hadde du vondt i korsryggen under svangerskapet?
☐ Nei ☐ Ja

25. Har du vondt i korsryggen nå?
☐ Nei ☐ Ja

26. Har du hatt vondt i korsryggen tidligere?

	Nei	*Ja*
Før første svangerskapet	☐	☐
I tidligere svangerskap	☐	☐
Mellom svangerskapene	☐	☐

27. Hadde du vondt i bekkenet ("bekkenløsning") i dette svangerskapet?
☐ Nei ☐ Ja

28. Har du vondt i bekkenet ("bekkenløsning") nå?
☐ Nei ☐ Ja

29. Dersom du hadde bekkenløsning i dette svangerskapet, hvor var det vondt? *(sett ett eller flere kryss)*
☐ Foran i bekkenet (ved kjønnsbenet/symfysen)
☐ På venstre side bak i bekkenet
☐ På høyre side bak i bekkenet
☐ Ingen av disse stedene

30. Brukte du stokk eller krykker på grunn av bekkensmerter under dette svangerskapet?
☐ Nei ☐ Ja

31. Våknet du om natten på grunn av bekkensmerter?
☐ Nei, aldri
☐ Ja, en sjelden gang
☐ Ja, ofte

32. Har du hatt vondt i bekkenet ("bekkenløsning") tidligere?

	Nei	*Ja*
Før første svangerskapet	☐	☐
I tidligere svangerskap	☐	☐
Mellom svangerskapene	☐	☐

33. Hvordan har du følt deg under svangerskapet?
☐ Vært i godt humør det meste av svangerskapet
☐ Vært trett, men i godt humør
☐ Tidvis følt meg nedfor
☐ Følt meg nedfor det meste av svangerskapet

34. Var du sykemeldt under svangerskapet?
☐ Nei
☐ Ja, deler av svangerskapet
☐ Ja, mesteparten av svangerskapet

35. Hvis du har vært sykemeldt: hva var årsaken til sykemeldingen?_____

36. Hvor lenge hadde du og barnefaren vært sammen da du ble gravid denne gangen?
_____ *år og/eller* _____ *mnd*

37. Hvor lenge hadde du regelmessige samleier *uten prevensjon* før du ble gravid denne gangen?
☐ Omtrent _____ (antall måneder)
☐ Hadde ikke regelmessige samleier
☐ Brukte prevensjon da jeg ble gravid
☐ Fikk behandling for å bli gravid, type behandling:
_____

38. Hvordan var din opplevelse av svangerskapet i det store og det hele?
☐ Veldig god ☐ Sånn passe
☐ God ☐ Dårlig

Fødselen og tiden etter

39. Hadde du en vanlig fødsel? *(sett ett eller flere kryss)*
☐ Ja ☐ Akutt keisersnitt
☐ Tvillingfødsel ☐ Forløst med tang/vakuum
☐ Setefødsel ☐ Annet _____
☐ Planlagt keisersnitt

40. Hva slags bedøvelse fikk du under fødselen? *(sett et eller flere kryss)*
☐ Ingen ☐ Petidin/morfin
☐ Lokalbedøvelse ☐ Epidural
☐ Lystgass ☐ Annet
☐ Akupunktur ☐ Vet ikke

41. **Hvor mange timer varte fødselen fra de første ordentlige veene startet?**
_____ *(antall timer)*

42. **Var noen av dine nærmeste med på fødselen?** *(sett gjerne flere kryss)*
☐ Nei ☐ Ja, annen kvinnelig slektning
☐ Ja, barnets far ☐ Ja, venninne
☐ Ja, min mor ☐ Annen_____

43. **Hvis noen av dine nærmeste var med på fødselen, hvordan likte du det?**
☐ Meget bra ☐ Sånn passe
☐ Bra ☐ Dårlig

44. **I det store og det hele, hvordan følte du deg under fødselen?**
☐ Jeg følte meg trygg
☐ Redd, men beholdt kontrollen
☐ Svært redd/fikk panikk

45. **Hvordan var din opplevelse av fødselen i det store og det hele?**
☐ Veldig god ☐ Sånn passe
☐ God ☐ Dårlig

46. **Følte du at familie eller andre nære gav hjelp og viste omsorg i dagene rundt fødselen?**
☐ Ja, i stor grad
☐ Ja, i noen grad
☐ I liten grad

47. **Hvor lenge var du på sykehuset?**
_____ *(antall overnattinger)*

48. **Hvor mange delte du rom med (når dere var flest)?**
_____ *(antall kvinner)*

49. **Følte du at du fikk nok søvn og hvile på sykehuset?**
☐ Nei
☐ Ja

50. **Hvor fornøyd var du med oppholdet på sykehuset?**
☐ Meget fornøyd
☐ Passe fornøyd
☐ Lite fornøyd

51. **Hvis du ikke var fornøyd med oppholdet på sykehuset, hva var du misfornøyd med?**
_____
(fortsett gjerne på siste siden)

52. **Ammer du nå?**
☐ Ja, barnet får bare morsmelk
☐ Ja, barnet får morsmelk + morsmelkerstatning
☐ Nei, jeg har sluttet
☐ Nei, jeg har ikke ammet i det hele tatt

53. **Omtrent hvor mange timer sover du nå i løpet av et døgn?**
_____ *(antall timer)*

54. **Føler du at du får nok søvn nå?**
☐ Nei ☐ Ja

55. **Opplevde du noen periode** (på et døgn eller mer) **i løpet av de første 10 dagene etter fødselen, hvor noen av følgende følelser dominerte?** *(sett ett eller flere kryss)*

	Ikke i det hele tatt	*Noen ganger*	*Ofte*	*Oftere enn noen gang tidligere*
Følte meg glad og trygg på meg selv	☐	☐	☐	☐
Følte meg elendig og deprimert	☐	☐	☐	☐
Tok lett til tårene	☐	☐	☐	☐
Var bekymret og engstelig	☐	☐	☐	☐
Var irritabel og oppfarende	☐	☐	☐	☐
Hadde et svært vekslende humør	☐	☐	☐	☐

56. **Om barnets helse til nå?** *(sett ett eller flere kryss)*
☐ Barnet har vært helt frisk
☐ Barnet har hatt kolikk
☐ Barnet har ligget i kuvøse
☐ Barnet har vært innlagt på barneavdeling
☐ Annet_____
(fortsett gjerne på siste siden)

Sykdommer, medisiner, levesett

57. **Har du noen av følgende sykdommer eller plager?** *(sett ett eller flere kryss)*
☐ Astma/allergi ☐ Underlivsplager
☐ Høyt blodtrykk ☐ Ledd/muskelsmerter
☐ Hjerte/karsykdom ☐ Hodepine/migrene
☐ Diabetes ☐ Psykiske plager
☐ Stoffskiftesykdom ☐ Annet?_____

58. **Har du i løpet av de siste 2 årene brukt medisiner regelmessig?**
☐ Nei ☐ Ja

59. **Hvis du har brukt medisiner regelmessig, *når* brukte du disse medisiner og hvilke(n) brukte du?**

	Hvilke(n) medisiner?
☐ Før graviditeten.	
☐ Under graviditeten	
☐ Nå	
☐ Har ikke brukt medisiner regelmessig	

60. **Hvor ofte har du drukket alkohol (øl, vin eller brennevin) de siste 14 dagene?**
☐ Jeg er totalavholdende, drikker aldri alkohol
☐ Jeg har ikke drukket alkohol, men er ikke totalavholdende
☐ Jeg har drukket 1-4 ganger
☐ Jeg har drukket 5-10 ganger
☐ Jeg har drukket mer enn 10 ganger

61. Har det vært perioder i livet da du har drukket for mye, eller i hvert fall i meste laget?

☐ Nei
☐ I tvil, kanskje
☐ Ja

62. Røyker du?

☐ Nei
☐ Ja, daglig _____ (antall sigaretter/dag)
☐ Ja, av og til _____ (gjennomsnittlig antall/uke)

63. Din vekt?

Før svangerskapet: _____ *(antall kg)*
Ved fødselen: _____ *(antall kg)*
Nå: _____ *(antall kg)*

64. Din høyde? _____ *(antall cm)*

Psykisk velvære

65. Dette handler om hvilken oppfatning du har av deg selv. Kryss av for hver av setningene under om du er svært enig, enig, uenig eller svært uenig.

	Svært enig	*Enig*	*Uenig*	*Svært uenig*
Jeg har en positiv holdning til meg selv	☐	☐	☐	☐
Jeg føler at jeg er en verdifull person, iallfall på lik linje med andre	☐	☐	☐	☐
Jeg føler at jeg *ikke* har mye å være stolt av	☐	☐	☐	☐
Jeg føler meg virkelig ubrukelig til tider	☐	☐	☐	☐

66. Har du noen gang brukt medisiner på grunn av psykiske plager?

☐ Nei
☐ Ja, hvilke(n)? _____

67. Har det noen gang i livet ditt vært sammenhengende perioder på 2 uker eller mer, da du:

	Nei	*Ja*
Følte deg deprimert, trist eller nedfor	☐	☐
Hadde problemer med matlysten eller spiste for mye	☐	☐
Var plaget av kraftløshet eller mangel på overskudd	☐	☐
Virkelig bebreidet deg selv og følte deg verdiløs	☐	☐
Hadde problemer med å konsentrere deg eller vanskelig for å ta beslutninger	☐	☐
Hadde minst tre av de problemene som er nevnt ovenfor samtidig	☐	☐

68. Har du svart *ja* på siste spørsmål (tre problemer samtidig), vil vi gjerne vite *når* dette var? *(sett ett eller flere kryss)*

☐ Etter tidligere graviditet (de første 2 mnd)
☐ I løpet av dette svangerskapet
☐ Nå, etter denne graviditeten
☐ Annet tidspunkt

69. Har søsken eller foreldre vært behandlet for depresjon?

☐ Nei ☐ Ja, hvem? _____ (søsken eller foreldre)
☐ Vet ikke

Følgende spørsmål gjelder *de siste 7 dagene.*

70. Har du siste 7 dager kunnet le og se det komiske i en situasjon?

☐ Like mye som vanlig
☐ Ikke riktig så mye som jeg pleier
☐ Klart mindre enn jeg pleier
☐ Ikke i det hele tatt

71. Har du siste 7 dager gledet deg til ting som skulle skje?

☐ Like mye som vanlig
☐ Noe mindre enn jeg pleier
☐ Klart mindre enn jeg pleier
☐ Nesten ikke i det hele tatt

72. Har du siste 7 dager bebreidet deg selv uten grunn når noe gikk galt?

☐ Ja, nesten hele tiden
☐ Ja, av og til
☐ Ikke særlig ofte
☐ Nei aldri

73. Har du siste 7 dager vært nervøs eller bekymret uten grunn?

☐ Nei, slett ikke
☐ Nesten aldri
☐ Ja, iblant
☐ Ja, veldig ofte

74. Har du siste 7 dager vært redd eller fått panikk uten grunn?

☐ Ja, svært ofte
☐ Ja, noen ganger
☐ Sjelden
☐ Nei, aldri

75. Har du siste 7 dager følt at det har blitt for mye for deg?

☐ Ja, jeg har stort sett ikke fungert i det hele tatt
☐ Ja, iblant har jeg ikke klart å fungere som jeg pleier
☐ Nei, for det meste har jeg klart meg bra
☐ Nei, jeg har klart meg like bra som vanlig

76. Har du siste 7 dager vært så ulykkelig at du har hatt vanskeligheter med å sove?

☐ Ja, for det meste
☐ Ja, iblant
☐ Ikke særlig ofte
☐ Nei, ikke i det hele tatt

77. Har du siste 7 dager følt deg nedfor eller ulykkelig?

☐ Ja, det meste av tiden
☐ Ja, ganske ofte
☐ Ikke særlig ofte
☐ Nei, ikke i det hele tatt

78. Har du siste 7 dager vært så ulykkelig at du har grått?

- ☐ Ja, nesten hele tiden
- ☐ Ja, veldig ofte
- ☐ Ja, det har skjedd iblant
- ☐ Nei, aldri

79. Har tanken på å skade deg selv streifet deg, de siste 7 dagene?

- ☐ Ja, nokså ofte
- ☐ Ja, av og til
- ☐ Ja, såvidt
- ☐ Aldri

80. Nedenfor er det en liste over problemer folk av og til har. Vurder hvor mye hvert problem var til plage eller ulempe for deg *siste uke* *(til og med i dag)*. Sett et kryss i den ruten som passer best. Husk å sette et *kryss ved hver plage.*

	Ikke plaget	*Litt plaget*	*Ganske mye plaget*	*Veldig mye plaget*
Plutselig frykt uten grunn	☐	☐	☐	☐
Stadig redd eller engstelig	☐	☐	☐	☐
Matthet eller svimmelhet	☐	☐	☐	☐
Nervøsitet, indre uro	☐	☐	☐	☐
Hjertebank, hjerteslag som løper avgårde	☐	☐	☐	☐
Skjelving	☐	☐	☐	☐
Føler deg anspent eller oppjaget	☐	☐	☐	☐
Hodepine	☐	☐	☐	☐
Anfall av angst eller panikk	☐	☐	☐	☐
Så rastløs at det er vanskelig å sitte stille	☐	☐	☐	☐
Mangel på energi, alt går langsommere enn vanlig	☐	☐	☐	☐
Lett for å klandre deg selv	☐	☐	☐	☐
Har lett for å gråte	☐	☐	☐	☐
Tap av seksuell interesse	☐	☐	☐	☐
Dårlig appetitt	☐	☐	☐	☐
Vanskelig for å sove	☐	☐	☐	☐
Følelse av håpløshet for framtida	☐	☐	☐	☐
Nedfor	☐	☐	☐	☐
Følelse av ensomhet	☐	☐	☐	☐
Har tanker om å gjøre slutt på livet	☐	☐	☐	☐
Følelse av å være fanget	☐	☐	☐	☐
Bekymrer deg for mye	☐	☐	☐	☐
Føler ikke interesse for noe	☐	☐	☐	☐
Føler at alt krever stor anstrengelse	☐	☐	☐	☐
Ikke noe verd/verdiløs	☐	☐	☐	☐

☐ Jeg kan ikke gjenkjenne meg i noen av de ovenforstående utsagn. Jeg føler at jeg har det bra.

Støtte fra andre

81. Har du noen som du virkelig kan betro deg til? *(utenom din ektefelle/samboer)?*

- ☐ Nei
- ☐ Ja. Hvor mange? _____

82. Hvor ofte treffer du eller snakker du i telefonen med din familie eller dine nære venner i løpet av en uke? *(regn bare med personer du ikke bor sammen med)*

- ☐ Mindre enn 5 ganger
- ☐ 5-10 ganger
- ☐ Mer enn 10 antall ganger

83. Hvordan passer denne beskrivelsen for deg?

	Passer helt	*Passer delvis*	*Passer slett ikke*
Jeg føler meg nært knyttet til min ektefelle/ samboer	☐	☐	☐
Det er et nært samhold mellom meg og min ektefelle/samboer	☐	☐	☐

☐ Jeg har ikke ektefelle/samboer

84. Synes du at du hadde for stor belastning med husarbeid/omsorgsarbeid i svangerskapet?

- ☐ Nei
- ☐ Ja
- ☐ Vet ikke

85. Synes du at du har for stor belastning med husarbeid/omsorgsarbeid nå?

- ☐ Nei
- ☐ Ja
- ☐ Vet ikke

Livshendelser, langvarige belastninger

86. Har du som voksen (etter fylte 18 år) opplevd at noen har gitt deg en ørefik, slått eller sparket deg eller plaget deg fysisk på annen måte?

- ☐ Nei
- ☐ Ja
- ☐ Husker ikke

87. Har noen siste 12 mnd gitt deg en ørefik, slått eller sparket deg eller plaget deg fysisk på annen måte?

- ☐ Nei
- ☐ Ja,_____*(antall ganger)*
- ☐ Husker ikke

88. Har du i løpet av de siste 12 måneder hatt mer langvarige vanskeligheter knyttet til følgende områder? *(Angi hvor stor belastningen har vært ved å sette kryss på hver av linjene).*

Grad av belastning:

	Ingen	*Noe*	*Ganske stor*	*Svært stor*
Boligproblem	☐	☐	☐	☐
Alkoholproblemer hos noen i husholdningen	☐	☐	☐	☐
Problemer med barn (tilsyn, oppdragelse, skole, disiplin)	☐	☐	☐	☐
Problem med å tilpasse yrkesliv med barneomsorg	☐	☐	☐	☐

89. Har du i løpet av de siste 12 månedene opplevd noe av det følgende? Hvis ja, hvor vondt eller vanskelig var det for deg? *(hvis det følgende ikke passer på deg setter du ikke noe kryss)*

	Ikke så ille	*Vondt/ vanskelig*	*Veldig vondt/ vanskelig*
Ble skilt, separert eller avbrøt samlivet	☐	☐	☐
Har hatt alvorlige samlivsproblemer	☐	☐	☐
Har hatt problemer eller konflikter med familie, venner eller naboer	☐	☐	☐
Har hatt problemer på arbeids-plassen eller der du utdanner deg	☐	☐	☐
Har hatt økonomiske problemer	☐	☐	☐
Har vært alvorlig syk eller skadet	☐	☐	☐
En av dine nærmeste har vært alvorlig syk eller skadet	☐	☐	☐
Har vært utsatt for trafikk-ulykke, brann eller tyveri	☐	☐	☐
Mistet en nær pårørende	☐	☐	☐

Annet?_____

☐ Jeg har ikke opplevd noe av det ovenstående

90. Har du noen gang etter du fylte 18 år opplevd at du ble presset eller tvunget til samleie *(sett eventuelt kryss ett eller flere steder)*

☐ Nei, aldri
☐ Ja, presset
☐ Ja, utøvd makt
☐ Ja, voldtatt

91. Har dette skjedd siste 12 måneder?

☐ Nei
☐ Ja

92. Hvordan har du det nå, i det store og det hele?

☐ Veldig bra
☐ Bra
☐ Sånn passe
☐ Dårlig

93. Hvis du har noen kommentarer eller noe som du ønsker å tilføye utover det som vi har spurt om, er du velkommen til å skrive om det.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Takk for hjelpen!

I

II

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ORIGINAL RESEARCH

Sexually transmitted infections among Pakistani pregnant women and their husbands in Norway

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Aim: To assess frequency and determine the factors associated with *Chlamydia trachomatis*, herpes simplex virus type 2, and hepatitis B seropositivity among Pakistani pregnant women and their husbands in Norway.

Methods: All together 112 couples of Pakistani origin living in Norway participated in our study. Blood samples were tested for immunoglobulin G (IgG) antibodies against *C. trachomatis,* herpes simplex virus type 2, and hepatitis B.

Results: Pakistani women had significantly lower age, education level, and years of residence in Norway compared to their male partners. Among the men, 12% had positive chlamydial IgG antibodies in contrast to 1% of the women. These couples were discordant, meaning that the 13 wives of positive men were not infected with *C. trachomatis*, and the husband of one positive woman was not infected either. Four percent of women and 2% of men were positive for herpes simplex type 2. Only one couple was concordantly positive for herpes simplex type 2, the remaining four couples were discordant. Twelve percent of women and 21% of men were, or had been, infected with hepatitis B.

Conclusion: Sexually transmitted infections did not seem to be prevalent in Pakistani immigrant couples in Norway. However, it was striking that most couples were discordant. Pakistani immigrants should be offered hepatitis B vaccine.

Keywords: *Chlamydia trachomatis*, herpes simplex virus type 2, hepatitis B, Pakistan, Norway

Introduction

The population of Norway was relatively homogeneous until 1970. Thereafter, a considerable migratory influx of immigrants, particularly from Asia and Africa has occurred. People originating from Pakistan constitute the largest immigrant group from low income countries, representing 7% of the total Norwegian population. Most of them live in Oslo and the suburbs.[1] The first Pakistani men came as economic immigrants in the late 1960s. After restriction for working purposes was imposed in 1975, immigration from Pakistan has mainly been for marriage and reuniting family, and consanguineous marriages are common.

Sexually transmitted infections (STIs) have shown an alarming increase in Asia and Africa.[2] Ethnic variations in the rate of diagnosed STIs have been reported in many developed countries. Indian and Pakistani women and men had lower prevalence of diagnoses STIs than black Caribbeans and black Africans in Great Britain.[3] In Norway, the typical STIs such as syphilis and gonorrhea are very seldom, while herpes simplex virus type 2 (HSV-2), *Chlamydia trachomatis*, and human papillomavirus are prevalent especially in the young generation.[4]

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Individual sexual behavior is a key determinant of STI transmission risk, but alone does not explain the varying risk across ethnic groups. There is a need for targeted and culturally competent prevention interventions.[3]

C. trachomatis is a major cause of ocular and sexually transmitted diseases worldwide.[5] Women sustain the most severe consequences of untreated infection, including pelvic inflammatory disease, chronic pelvic pain, ectopic pregnancy, and tubal infertility. Most chlamydial infections are asymptomatic.[6] In Norway, 84% of young females below 25 years of age have been tested and 9%–11% have been positive, while among the 44% tested young adult males, 21% have been positive.[7]

HSV-2 is the leading cause of genital ulcer disease worldwide. HSV-2 infection also represents a risk factor for the acquisition and transmission of human immunodeficiency virus (HIV).[8] A serious consequence of HSV-2 infection is the transmission of the virus from an infected mother to a neonate, usually intrapartum. Neonatal infection can cause long-term sequalae and even death.[9] In Norway, 14% of the pregnant population have been tested HSV-2 positive.[10]

Hepatitis B virus (HBV) infection is a major health problem globally including Pakistan.[11] HBV may lead to severe chronic infection and hepatocellular carcinoma. Fifty percent of infections are thought to be acquired by sexual contact.[12] In countries where HBV is endemic, vertical spread plays a major role.[13] Among ethnic Norwegians, hepatitis B carriership is rare (<0.5%).[14] The frequency among immigrants may reflect the situation in their home countries, but must also take into account the situation in the new country.

Studies of STIs among immigrants to Europe are mainly focusing on syphilis and HIV, and not the more common STIs.[15] Our aim was to take an in-depth look at STIs like *C. trachomatis*, HSV-2, and hepatitis B among our Pakistani immigrants in Norway.

Material and methods

The Pakistani women who came to prenatal ultrasound screening at 17–18 weeks of gestation in the two maternity hospitals in Oslo (Rikshospitalet and Ullevål University Hospital) were randomly included. The first author visited Oslo once a week over two years for interviewing and blood collections of the Pakistani women and their husbands. We included 112 Pakistani pairs, after getting their personal consent and signature. They lived in Oslo city or one of the suburbs. The samples, collected in ethylenediaminetetraacetic acid tubes, were separated, and plasma was frozen at –20°C.

In 2009, we analyzed the immunoglobulin G (IgG) antibodies to *C. trachomatis,* HSV-2, and HBV. If the antibody to the core antigen of HBV (anti-HBc) IgG was present, we analyzed also the surface antigen of HBV (HBsAg) and the antibody to the surface antigen of HBV (anti-HBs).

Analysis of *C. trachomatis* was performed with SeroCT™ IgG (Savyon Diagnostics, Ashdod, Israel). Analysis of HSV-2 IgG was performed with HerpeSelect®2 Elisa IgG (FOCUS Diagnostics, Cyprus, CA). Analysis of anti-HBc, HBsAg, and anti-HBs were performed with chemiluminescent immunoassay (Abbott Laboratories, Abbott Park, IL).

IgG measurement were registered as "negative", "grey zone" meaning neither negative nor positive, "slightly positive" meaning that specificity may be uncertain, and "positive". In our study we regard "grey zone" as "negative" and "slightly positive" as "positive".

The study was approved by the Regional Committee for Ethics and Research and the Data Inspectorate.

Variables

A structured questionnaire was used. Information about demographic and socioeconomic factors such as age, marital status, relationship, educational level, parity, family income, and years of residence in Norway were registered.

Statistical analyses

All data were registered in SPSS (SPSS Inc, Chicago, IL). Descriptive statistics (including means, standard deviations [SD], frequencies, and percentage) were used to analyze distribution of the demographic variables.

Differences in demographic and serologic results between men and women were tested with Fisher's exact test. Signifier level of $P < 0.05$ was used. The relationship between seroposivity of *C. trachomatis,* HSV-2, and hepatitis B and determined factors were estimated by logistic regression analyses and presented as crude odds ratios with 95% confidence interval.

Results

Significant differences were observed in age, level of education, and time of residence in Norway between men and women. The average age for Pakistani women was 27.5 years (range 18–44 years; SD 5.4 years), and 32.7 years for their husbands (range 18–56 years; SD 7.9 years). Consanguineous marriages were common (70%), 47% were cousins (close relatives), and 23% were distant relatives. None of the women were educated at university level while 12% of the

men had tertiary education. The family income was within the Norwegian average for 57% of the participants. Two thirds (67%) of the men had lived more than 10 years in Norway. Twenty seven women (24%) had recently arrived in Norway compared to eight men (7%) (Table 1).

Serologic results

Differences between men and women were also found in seropositivity of *C. trachomatis,* HSV-2, and hepatitis B. Due to low prevalence, the differences did not reach significance. Thirteen men (12%) had chlamydial IgG antibodies, while only one woman (1%) was positive. This woman was 31 years old, had lived two years in Norway, had low educational level (less than nine years schooling), and the family had low income. All positive cases occurred in discordant couples, meaning that the 13 wives of the positive men were not infected with *C. trachomatis,* and the husband of the one positive woman was not infected either (Table 2).

There were no differences in ages and educational levels of the chlamydial IgG positive and negative men. Of the 13 positive men, 69% had high income.

Four women (4%) and two men (2%) were positive for HSV-2. Only one couple was both positive for HSV-2, the remaining four couples were discordant (Table 2).

Table 1 Demographic characteristics of 112 Pakistani immigrant couples living in Norway

	Couples	Women	Men	Test
Total	112 (100%)	112 (100%)	112 (100%)	
Age in years (mean)		27.5	32.7	$P = 0.001$*
Consanguinity				
Close relative	53 (47%)			
Distant relative	26 (23%)			
No relative	33 (30%)			
Educational level				
<9 years of school		30 (27%)	17 (15%)	
9 years of school		29 (26%)	19 (17%)	
High school level		53 (47%)	63 (56%)	
University level		0	13 (12%)	$P = 0.001$**
Number of children				
1 child	32 (29%)			
>1 child	80 (71%)			
Family income, NOK				
≤200,000	41 (37%)			
201–400,000	64 (57%)			
>400,000	7 (6%)			
Years of residence in Norway				
≤1		27 (24%)	8 (7%)	
2–9		48 (43%)	29 (26%)	
≥10		37 (33%)	75 (67%)	$P = 0.038$**

Notes: *T-test; **Fisher's exact test.
Abbreviation: NOK, Norwegian krone.

As for hepatitis B, one woman (1%) and two men (2%) were anti-HBc and HBsAg positive. Five of the women (4%) and seven of the men (6%) were only anti-HBc positive. All of these 15 hepatitis B-affected couples were discordant (Table 3).

Eight of the women (7%) and 14 of the men (13%) were both anti-HBc positive and anti-HBs positive. Only one couple was concordant (Table 3).

Discussion

To our knowledge, this is the first study about STIs among Pakistani immigrants in Norway. In our couples, *C. trachomatis* and HSV-2 were not prevalent. Since our testing was based on serological samples and detection of antibodies, it reflects what has happened during their lifetime and the great majority of our men and women had never been infected with these STIs.

Pakistani women in our study came to Norway for marriages. We did not ask about their husbands' sexual behavior. In Vietnam, women with low education or low economic status had less knowledge of STI than those with higher education or high income. Unmarried women and those under the age of 20 years demonstrated the lowest level of STI knowledge.[16]

All pregnant women in Norway are tested for HIV. None of the Pakistani pregnant women in our study were HIV positive. Therefore we did not examine their husbands' HIV IgG.

Hepatitis C virus (HCV) infection is not a common STI. Transmission of HCV occurs first and foremost through contaminated blood and blood products, blood transfusion, and contaminated syringes. Sexual transmission occurs, but is unusual. Vertical infection occurs, calculated risk is about 10%.[4] For these reasons we did not test HCV IgG.

Gonorrhea is a rare disease in Norway.[4] Furthermore, no test is suitable for testing of *Neisseria gonorrhoeae* IgG.

We found only 1% *C. trachomatis* prevalence in females, but higher in men (12%), and the couples were discordant. According to the producer's information, the sensitivity of the test used is 95%, and the specificity 90%–91%, compared to micro-immunofluorescence. Our findings indicate a much lower prevalence of *C. trachomatis* among both women and men of Pakistani origin compared to the general population of Norway with a reported prevalence of 9%–11% for women 15–24 years old, and 21% for men 20–24 years old.[7] In Australia, *C. trachomatis* prevalence was 7% in females and 5% in males.[17] Undocumented migrant status is also reported to be associated with higher risk of

Table 2 Prevalence of *Chlamydia trachomatis* and HSV-2 IgG antibodies among Pakistani immigrant couples living in Norway

Infection	Women n = 112	Men n = 112	Test*	Concordant infected couples	Discordant infected couples
Chlamydial IgG present	1 (1%)	13 (12%)	$P = 1.000$	0	14 (13%)
HSV-2 IgG present	4 (4%)	2 (2%)	$P = 0.700$	1 (1%)	4 (4%)

Note: *Fisher's exact test.

C. trachomatis prevalence. A study from Switzerland reported *C. trachomatis* to be three times more frequent in undocumented migrants (13%) than in women with legal residency (4%).[18]

In our study, the seropositivity of HSV-2 was low, 4% in women and 2% in men. According to the producer's information, the sensitivity of the test used is 96.1%, and specificity is 97%, compared with Western blot. The prevalence of HSV-2 was 17% in STI patients and 14% in pregnant women in Norway.[10] Prevalence of HSV-2 infection was 34.8% in northern California. Black race, older age, lower income, parity, greater number of lifetime male sexual partners, earlier onset of sexual intercourse, sex work, history of STI, and cocaine use were factors associated with HSV-2 positivity.[19] In Israel, the prevalence of HSV-2 infection was 13.3%, and the rate was threefold higher among immigrants from the former Soviet Union (27.5%) than among Israeli-born Jewish and Arab women (9%). The role of high-risk sexual behavior in the spread of the infection has been reconfirmed.[20]

Twelve percent of women and 21% of men were or had been infected with hepatitis B. Since HBV infection in this population often is acquired at birth or in childhood, this infection cannot be regarded as a measure of STIs.

A Norwegian report from 2007 showed that immigrants had higher risk of diseases, in particular severe infectious diseases.[21] The first cause presuming immigrants to be a group especially exposed to extra burden due to their situation as immigrants. The second is that living conditions among immigrants are generally worse than in the majority population. They have lower income, are more likely to be unemployed, have worse housing situations, and lower educational level. Immigrants from low-income countries have higher prevalence of hepatitis B, HIV, and tuberculosis which reflect their situation in their home country. They are usually infected before they come to Norway, or they get infected when they visit their home countries.[21] In our study, there was also a tendency towards more infections among persons with low income or low education level. Due to the relatively small sample the results only reached significance for the association of hepatitis B in women with low education level.

From 1991, World Health Organization (WHO) recommended all member countries to introduce HBV vaccine in their immunization programs. With recent dramatic increases in HBV vaccine production and decreases in the price, global HBV infection rates may be reduced by as much as 90% over the next 10 years.[22] In our study, under 1% of the women and 2% of the men were positive for HBsAg, which means their blood, cervical secretion, and sperm are infectious. Four percent of the women and 6% of the men were positive for anti-HBc only, possibly low-level HBV infection, and risk of transmission could not be excluded. In Pakistan, almost 2% were positive for HBsAg, being in the same range as among our Pakistani immigrants.[23] In 2005, Norwegian Institute of Public Health estimated that we had 12,000–15,000 HBV carriers (<0.5%).[14] A majority of these are immigrants from high and middle endemic areas, plus drug addicts. A Norwegian working group has recently suggested including HBV vaccination in our national program.[24]

Table 3 Serological status of HBV among 112 pairs of Pakistani immigrants in Norway

Hepatitis B	Women n = 112	Men n = 112	Test*	Concordant infected couples	Discordant infected couples
HBsAg positive Anti-HBc positive "carrier"	1 (1%)	2 (2%)	$P = 1.000$	0	3 (3%)
Anti-HBc positive	5 (4%)	7 (6%)	$P = 1.000$	0	12 (11%)
Anti-HBc and anti-HBs positive "previous infection"	8 (7%)	14 (13%)	$P = 0.414$	1 (1%)	20 (18%)

Note: *Fisher's exact test.

Table 4 Factors associated with *Chlamydia trachomatis*, HSV-2, and hepatitis B seropositivity among Pakistani pregnant women and their husbands in Norway

Factor	Positive IgG	Negative IgG	Total	Crude odds ratio (95% confidence interval) unadjusted
C. trachomatis, men				
Age, years				
≥25	11 (11)	86 (89)	97 (100)	1
<25	2 (13)	13 (87)	15 (100)	1.2 (0.2–6.1)
Educational level				
≥9 years of school	8 (11)	68 (89)	76 (100)	1
<9 years of school	5 (14)	3 (86)	36 (100)	1.4 (0.4–4.5)
Family income, NOK				
≥300,000	9 (15)	50 (85)	59 (100)	1
<300,000	4 (8)	49 (92)	53 (100)	0.5 (0.1–1.6)
HSV-2, women				
Age, years				
≥25	4 (6)	66 (94)	70 (100)	1
<25	0	42 (100)	42 (100)	0
Educational level				
≥9 years of school	3 (6)	50 (94)	53 (100)	1
<9 years of school	1 (2)	58 (98)	59 (100)	0.3 (0.1–2.9)
Family income, NOK				
≥300,000	1 (2)	58 (98)	59 (100)	1
<300,000	3 (6)	50 (94)	53 (100)	3.5 (0.4–35.0)
HSV-2, men				
Age, years				
≥25	2 (2)	95 (98)	97 (100)	1
<25	0	15 (100)	15 (100)	0
Educational level				
≥9 years of school	2 (3)	74 (97)	76 (100)	1
<9 years of school	0	36 (100)	36 (100)	0
Family income, NOK				
≥300,000	2 (3)	57 (97)	59 (100)	1
<300,000	0	53 (100)	53 (100)	0
Hepatitis B, women				
Age, years				
≥25	9 (13)	61 (87)	70 (100)	1
<25	5 (12)	37 (88)	42 (100)	0.9 (0.3–3.0)
Educational level				
≥9 years of school	3 (6)	50 (94)	53 (100)	1
<9 years of school	11 (19)	48 (81)	59 (100)	3.8* (1.0–14.5)
Family income, NOK				
≥300,000	9 (15)	50 (85)	59 (100)	1
<300,000	5 (9)	48 (91)	53 (100)	0.6 (0.2–1.9)
Hepatitis B, men				
Age, years				
≥25	22 (23)	75 (77)	97 (100)	1
<25	1 (7)	14 (93)	15 (100)	0.2 (0.3–2.0)
Educational level				
≥9 years of school	14 (18)	62 (82)	76 (100)	1
<9 years of school	9 (25)	27 (75)	36 (100)	4.1 (0.5–33.0)
Family income, NOK				
≥300,000	10 (17)	49 (83)	59 (100)	1
<300,000	13 (25)	40 (75)	53 (100)	1.6 (0.6–4.0)

Abbreviation: NOK, Norwegian krone.

The occurrence of "anti-HBc only positive" represents a special problem and raises some questions. HBV DNA determination in single samples is of limited value. Of the anti-HBc only positives, about 5% will be DNA positive with polymerase chain reaction, the percentage may show some variation according to ethnic origin. Furthermore, the viremia level may vary between detectable and undetectable over time. Therefore we usually do not recommend DNA testing, and did not perform such testing in our material. From a public health standpoint, it is more meaningful to recommend vaccination to sexual partners and family members, and to give specific immunoglobulin and vaccine to the newborns of anti-HBc only, positive mothers.

Pakistani women in Norway with low education was a risk group for hepatitis B infection.

There was also a tendency among men, but the results did not reach significance (Table 4).

We did not find any specific factors associated with seropositivity for *C. trachomatis* and HSV-2 among Pakistani immigrant couples in Norway (Table 4).

Conclusion

STIs were not prevalent in Pakistani immigrant couples in Norway. However, it was striking that when one partner was positive, the other was not, so most couples were discordant. More men than women had undergone *C. trachomatis* infection, they possibly had earlier sexual experiences before marriage, and the women may not have or are not having concurrent sexual experiences. The men either had *C. trachomatis* before the marriage and cleared the infection or had it during the marriage and cleared it before transmitting to the wife. One should pay attention to hepatitis B among Pakistani immigrants. WHO has recommended including HBV vaccine in the immunization programs.

Meanwhile, Pakistani immigrants who are unprotected against infection should be offered HBV vaccine and newborn children whose mothers are HBsAg positive or only anti-HBc positive should be treated with immunoprophylaxis and vaccine shortly after delivery.

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III

IV